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Journal of the Asiatic
Society of Bengal

JOURNAL

OF

THE ASIATIC SOCIETY.

NO. 93.—SEPTEMBER, 1839.

ART. I.—*Sanscrit Inscription on the Slab removed from above the Kothoutiya gate of the Fort Rohtas. By the Editors.*

In our May number, we presented our readers with an interesting letter from Mr. RAVENSHAW, communicating some inscriptions collected in Behar. Mr. RAVENSHAW notices the Persian Inscription over the gateway of the palace on the summit of the fort of *Rohtas*. This informs us that the palace was built by RAJA MAN SING. The date of the inscription is the 28th day of the 7th month of 1005, H. Æ., or about the middle of April, 1597 A. D. Mr. RAVENSHAW adds, that the Sanscrit inscription over the Kothoutiya gate of the fort had been taken to Europe by Mr. W. EWER, and is then on the premises of Mr. LUKE. It has since been forwarded to the *Asiatic Society*, and we are thus enabled to present our readers with a transcript and translation. The inscription gives the following genealogy of the TOMARA family eleven generations, and twelve Rajas.

VIRA SINH,
UDDHARAN,
GANA PATI,
HANGARA SINGH DEVA,
KIRTI SINH,
KALYANA SAHI,
MANA SAHI,
VIKRAMA SAHI,
RAMA SAHI,
SALI VAHANA, left two sons.
SYAMA SAHI and VIRA MITRA SEN.

VIRA MITRA SEN, the last, succeeded his brother, and is stated to have conquered from SHER KHAN the fortress of *Rohitaśwa*,—to the astonishment of the Emperor of *Delhi*. He rebuilt it, and it became known by his name. He erected in it a row of lofty temples, in which he located SIVA under the name of MITRESWARA, and he also in 1581 Sumbut, or 1631 A. D., built a palace and a *Mundira* in which he located DURGA, and it was by his order that the Poet SIVA DEV MAITHILA (celebrated at the Court of *Delhi*) composed, in honor of this illustrious family, the verses which were found engraved over the *Kothoutiya* gate. This is named from the neck of rock which joins the hill to the table land. BUCHANAN mentions this inscription,* evidently was not acquainted with its contents. He describes it as confirming the facts obtained from the Persian inscription, and as contemporary with it. But in reality there is no mention of the Vira MAN SINGH, and the date 1654 Sumbut, quoted by BUCHANAN, seems to have been obtained by the addition of 57 to 1597, the Christian year, which corresponds with 1005, H. Æ. In the *Sanskrit* inscription the figures 1688 are very distinct, and this year also results from the conventional numeral words used, "*vasu dwana shat chandra*."

The bold assertion that VIR MITRA took the fort from the formidable SHER KHAN is not justified by history; and if we assume the evidence of the stone, as we perhaps may, that VIR MITRA was living in 1631 A. D. it is impossible that he could have been opposed in war to the celebrated *Pathan* emperor who died in 1540. We are left then to surmise that VIR MITRA SEN may have been a native chieftain of that part of *Behar*, and perhaps entrusted by the *Mohammedan* ruler with the charge of the fort. The invention and adulation of the poet has supplied the rest.

Though the slab should be thus convicted of error and exaggeration there may still be some historical facts pointed at. In the verse the grandfather of VIR MITRA's great-grandfather is represented to have sustained the king of *Yavanapura* (*Jionpoor*),—king of the east, against the emperor of *Delhi*. The dominion of *Jionpoor Muslim* kings extended to *Behar*. Allusion is probably made to the emperor BELOLI, and HOSEN SHAH the king of the *E. Bengal*. After a long struggle the latter was in 1478, driven to seek shelter with ALLAHUDDIN the ruler of Bengal. It may be observed that the Hindus applied the term *Yavana* to denote their *Afghan* invaders, though this term properly belongs to the Greek or *Ionian*. We have

* Buchanan, vol. iii. p. 432.

entering the seventh stanza, ventured to construe the concluding part alluding to the use of artillery, by the modern name of *top*. The words admit of a different version, and we are not satisfied that we are justified in the liberty taken. MANA SAHI, the father of the great-grandfather of VIRA SINGH, was the lord of *Gopachala*, indicating probably a neighbouring hill fort. If any gentleman near *Rohtas* would institute an inquiry as to whether any of the *Tomara* family there still exists, and if their family traditions or records in any way square with the particulars of the inscription,—an important service would be rendered.

We learn from the 12th verse, that JALALUDDIN ever designated MIRA SEN and his brother as 'the unique heroes.' JALALUDDIN was the name of AKBAR, who died in 1605 A. D. The style of these verses is modern, and their merit is rather mediocre.

BUCHANAN is stated by BUCHANAN to have taken the fortress of *Rohtas* by surprise. He mentions that the tradition is, that it was wrested in 1534 A. D., from the last *Hindu* Emperor of *Hindustan*, a descendant of PRATAPA DEVALA,* to whose family the fort belonged. What authority BUCHANAN has elevated the descendant of the descendant of *Japila* into the last *Hindu* emperor, does not appear. In closing this article, we would remark that the *Rohtas* slab gives a useful lesson of caution to distrust panegyric inscriptions.

The removal of slabs from ancient buildings and temples has been condemned by the good sense of the Asiatic Society, and we suggest that the *Rohtas* slab should be restored to its proper place.

तस्यै नमः ॥

नत्वा वागीश्वरीयं चरणसरसिजं कृष्णदेवच्च नत्वा
नत्वा चित्ते गणेशं त्रिभुवनजननीं भावयित्वा च दुर्गां ।
वरश्रीमित्रसेनचित्तिमुकुटमणेरान्नया पाण्डुवंशे
ख्यातान् गोणवंश्यान् हृमिह कियतः कीर्त्तितः कीर्त्तयामि ॥१॥

* See our May No.

विख्यातः सोमवंशः समभवदथ यः पाण्डुवंशस्ततोभू
द्वंशः श्रीतोमराणां समरविजयिनां कोटिशो यत्र वीराः ।
तत्र श्रीवीरसिंहः समजनि समरे येन जित्वा नरेन्द्रान्
दुर्गे गोपाचलाख्ये यरचि शतमुखी प्राज्यसाम्राज्यलक्ष्मीः ॥२॥

पुत्रस्तस्यानु भूपः समभवदवनीमुद्धरन्ननुग्रतेजाः
अथैर्विद्वद्भिरचोद्धरण इति कृतं नाम यस्योचितार्थं ।
तत्सूनु वैरिवीरचितिपतिदमनादीरमो वीर एकः
श्रुत्वा यदीरभावं सुरपतिरधिकं कम्पवान् स्तम्भितो भूत् ॥३॥

तस्य प्रत्यर्थिपृथ्वीपतिनतिविवलन्मौलिमालाङ्घ्रिपद्मः
पद्माविश्रामभूमिर्गणपतिरभवत् सूनुरन्यूनतेजाः ।
यस्मिन् गोपाचलस्थे कथयति समभून्नैव दिक्क्षीश्वराणां
चेतोऽप्यत्र प्रयातं किमुत बलमहो कोऽपि यस्य प्रभावः ॥४॥

तत् सूनुः समभूदपूर्वमहिमा हेमाद्रिवत् सुस्थिरः
संग्रामेऽर्थिजनस्य दैवततरुः श्रीशौट्यधैट्याश्रयः ।
यः सिंहोल्पमृगानिवारिनुपतीनुन्मर्दयन् दोर्बलात्
प्राप्तो ऋङ्गुरसिंहदेवपदवीं ख्यातां जगन्मण्डले ॥५॥

तत् पुत्रः कीर्त्तिसिंहः समजनि न भयाद् यस्य संग्रामलीलां
चक्रुर्वैरिचितीन्द्रास्त्रिजगति विदितौ यस्य दानप्रतापी ।
यस्मिन्नेकान्तचित्ते भजति हरिहरौ कम्पिता शक्रलक्ष्मी
र्यद्दोर्दण्डप्रचण्डं धनुरभजदहो चण्डगाण्डीवशोभां ॥६॥

श्रीमान् कल्याणसाहिः समजनि तनयस्तस्य यस्य प्रसादात्
संग्रामे प्राप्य कान्तात् सुरपुरवनिनानन्दनान्तःस्फुरन्ति ।
सौख्यं दिक्क्षीशमाजौ करितुरगघटाटोपसंघट्टमध्ये
द्राग् जित्वा शत्रुसेनां यवनपुरपतिं स्थापयामास राज्ये ॥७॥

त् सूनूर्मानसाहिर्दिशिदिशिविदितोद्दामदानप्रतिष्ठः
 एक्रोथं किं कुवेरो बलिरिति विदुषां संशयो यत्र वृत्तः ।
 तस्मिन् गोपाचलेन्द्रे विजयिनि विविधां कीर्त्तिमुद्गातुकामा
 गोद्यत्संगीतरागा ध्रुपदशतपदा भारती संबभूव ॥८॥

प्रोमद्विक्रमसाहिरद्भुतयशस्तत् सूनूरासीदभि
 गोद्यत् प्रौढतरप्रतापतपनप्रोत्सारितारिव्रजः ।
 प्रह्वानेन सुरद्रुमादिरभजत् काष्ठायितो मूकतां
 यत् कान्त्या तुलितः सुधांशुरभवद् व्योमाश्रितो लाघवात् ॥९॥

श्रीरामसाहिरभवत्तनयोऽथ तस्य
 प्रत्याशमुल्लसितविक्रमशौर्यधैर्यः ।
 यन्नामनि श्रुतिपथातिथितामुपेते
 सद्योधनुः स्वलति पाणितलात् परेषां ॥१०॥

श्रीशालिवाहन इति प्रथितोऽस्य पुत्रः
 प्रख्यातकीर्त्ति रतिदानदयाविवेकैः ।
 यः सङ्गरे बह्वविधानृपतीन् निहत्य
 प्राप्तः सुरेश्वरविभूषितमासनाङ्घ्रिं ॥११॥

तस्य श्रीश्यामसाहिः क्षितिमुकुटमणिर्मित्रसेनश्च पुत्रौ
 त्रैलोक्यख्यातकीर्त्ति प्रतिबलजलधेरन्तरौर्वायमाणौ ।
 दाने युद्धे दयायां हरिहरचरणाम्भोजपूजाप्रसक्तौ
 नित्यं यावेकवीरौ कथयति सततं साहि जलालदीनः ॥ १२ ॥

तत्र श्रीश्यामसाहिर्दिवमगमदभिद्योतयन् स्वर्गमार्गं
 प्रह्लादोवाम्बरीषो बलिरिति किमुवेत्येवमुक्तोमुनीन्द्रैः ।
 वीरश्रीमित्रसेनः क्षितिपतिरनुजस्तस्य तद्विप्रयोगे
 व्यग्रोऽप्युग्रैः प्रतापैः प्रतिनृपतिचमून् त्रासयन् पाति पृथ्वीं ॥ १३ ॥

यःप्रद्योत् प्रौढवीर्यो भुजबलविवलङ्गीमसेनो बलेन
द्राग् दुर्गं रोहिताश्वे स्वकमद्यत ह्यती सेरषानं विजित्य ।
नैतत् कोऽपि व्यधासीदिति चकितमतिर्विचय दीक्षीश्वरोऽपि
प्रोवाचान्येपि वीराः समरविजयिनो विस्मयं प्राप्सुर्नैः ॥ १४ ॥

अस्य श्रीमित्रसेनक्षितिमुकुटमण्णैर्दानसङ्कल्पवार्भि
र्विद्वहारिद्यु दावानलवह्लशिखाशान्तिमभ्याजगाम ।
उत्पन्ना साथ वैरिक्षितिपतिभवने तदधूनेत्रनीर
प्रौढप्रोद्यत् स्ववन्तीततिभिरपि भृशं स्नानिमानं प्रपेदे ॥ १५ ॥

सोऽयं श्रीमित्रसेनक्षितिमुकुटमणिभूतले कल्पवृक्षो
दुर्भिक्षोपद्रुतानामशनभरणयोर्ब्राह्मणानां प्रदानात् ।
दायंदायं तुलाभिस्तुलितमगणितं स्वर्णरौप्यादि वेश्म
प्रोच्चैर्निमाययित्वा द्विजवरतिलकं स्थापयामास काश्यां ॥ १६ ॥

एवं दाता वदान्योबलगुणनिलयो मित्रसेनो नरेशो
भयं श्रीरोहिताश्वं नवमद्यत ह्यती यस्य नाम्नैषदुर्गः ।
किञ्च प्रोच्चैर्विधायोद्भटमठघटनां तत्र मित्रेश्वराख्यं
शम्भुं संस्थाप्य दिव्योपवनमिह जयन्नन्दनादि व्यधासीत् ॥ १७ ॥

सौधं भूमीन्दुचूडामणिरह्यत वसुधन्द्व षट्चन्द्र १६८८ संख्ये
वर्षे श्रीविक्रमार्कक्षितिपतिगणिते संवते सम्मतश्रीः ।
ह्यत्वेतन्मन्दिराख्यं त्रिभुवनजननीं स्थापयामास दुर्गा
मेतत् काव्यानि चक्रे मिथिभुवि विदितः कृष्णदेवात्मजन्मा ॥ १८ ॥

दीक्षीन्द्रादिसभासु लब्धयशसो वैदेहभूमीभुवः
श्रीकृष्णार्पितचेतसस्त्रिजगतीं तत्त्वेन संपश्यतः ।
धीरश्रीशिवदेवपण्डितकवेः पद्यानि हृद्यान्यमू
न्यानन्दं जनयन्तु सत्सुमनसां पीयूषधारा इव ॥ १९ ॥

अस्ति त्रैलोक्यलोकोत्तरविधिरचनादृष्टदृष्टान्तसारः
 नाकारैः स्वर्णभूमीधरइव विलसत्सौधसौधाधरश्रीः ।
 मूर्ध्ना विन्धस्य दिव्योपवनघनपुरीकूपकासारहारः
 सर्वान्नोत्पत्तिभूमिर्भुवनभयहरो यत्र विप्रो गदेन्द्रः ॥ २० ॥

सन्तः सन्तोषमुदिता राजानो धर्मतत्पराः ।
 प्रजाश्च सुखिताः सन्तु सुभिन्नश्चास्तु सर्वदा ॥ २१ ॥

शुभमस्तु श्रीरस्तु ॥

TRANSLATION.

1. Salutation to HER. By the order of the hero, the illustrious MITRA SEN, a gem on the diadem of the universe, I eulogize for their glory, some celebrated scions of the Gona race in the lineage of PANDU, having first praised the lotus of the feet of SARASWATI, and having prostrated myself before the divine KRISHNA, meditating on GANESA, and contemplating DURGA, the mother of the universe.

2. Renowned was the Lunar race. From the lineage of PANDU sprang the TOMARAS, victorious in war,—in which are millions of heroes. In this was Vira Singh born, by whom, when he had conquered kings, were wrought many imperial fortunes looking in a hundred directions.

3. His son was that great hero of resplendent glory, to whom the wise had fixed the appropriate name of UDDHARAN, as if upholding the world. His son was VIRAMA, a hero singular from his subjection of hostile warrior kings. Hearing of his prowess, INDRA, trembling excessively, stood aghast.

4. His son was the illustrious GANA PATI, the shrine of the lotus-born goddess, at whose feet glided the coronal gems of hostile kings in their prostrations. Of whom, how vast was the power; placed as he was in his fort, and saying—"the thought even of the lords of *Delhi* never reached this place."

5. His son was unprecedentedly great, firm in war, like the snow-clad mountain,—the divine tree to the supplicant—the asylum of valor and constancy; who crushing by force the kings his enemies, as a lion does the deer, got the title of HUNGARA SINGA DEVA, celebrated throughout the world.

6. To him, a son KIRTI SINGH was born, from fear of whom, king ceased to fight,—whose liberality was celebrated in three worlds,—who intently adoring HARI and HARA, trembled the fortune of INDRA,—in whose brawny arms a terrific bow rivalled the grace of the awe inspiring arc of ARJUN.

7. To whom was born an illustrious son KALYANA SAHI, by whose favor the nymphs of paradise, in the bower of INDRA, revel in joy with lovers obtained by the fate of war—who happily established in his kingdom the lord of *Yavanapur*, after he had quickly overthrown in war the king of *Delhi* and his hostile army, in the conflict of artillery and squadrons of horse and elephants.

8. His son was MANA SAHI, renowned in every quarter, and celebrated for his generosity. “What is this INDRA, KUPERA, or BALI?” Such were the doubts of the learned: while him the lord of *Gopachala* conquering,—BHARATI in strains of ascending melody modulated in the different harmonic notes loved to celebrate his complicated glory.

9. His son was VIKRAMA SAHI, surpassing fame—the crowd of whose enemies was dispelled by the heat of his intense and culminating glory;—in consequence of whose liberality, the divine tree and other sources of gifts withering as it were, became abashed.

10. His son was RAM SAHAJ, whose prowess, valor, and perseverance, shewed in every quarter,—at whose name, a guest unwelcome to their cars—forthwith slipped the bows from the palms of his enemies hands.

11. His son was SALI VAHANA, celebrated for his excessive generosity and clemency,—who when he had in war overthrown many kings, shared the throne, graced by the regent of the gods.

12. His sons were SYAMA SAHI, a gem on the diadem of the universe, and MITRA SENA, renowned in the three worlds,—volcanoes in the ocean of their enemies’ army,—fervent in gift, war, and mercy—and votaries of the lotus of the feet of HARA and HARI.—Ever does JALALUDDIN SHAH designate them as unique heroes.

13. SYAM SAHI died illuminating the roads of heaven, designated by holy saints as PRAHLADA AMBARISHA or BALI. On his death, VIRA MITRA SEN the younger brother of that monarch, though grieved, protects the world, awing the armies of hostile kings by his intense majesty.

14. Apt to baffle the martial throng by force of his arm,—which experienced warrior of unrivalled prowess, having conquered SHER KHAN quickly made his own the fort at *Rohitaswa*: beholding that, the

ounded emperor of *Delhi* exclaimed, no one has ever effected the same—other conquering heroes also felt intense astonishment.

15. On occasion of his vows of gift, by the libations of that *MITRA SEN*, a gem on the diadem of the world were extinguished—the many flames issuing from the fire of the poverty of the learned. That produced in the house of hostile kings, often was suppressed by streams of tears profusely gushing from the eyes of their wives.

16. From his donation of support and food to famine-stricken Brahmans, a divine tree on earth—that *MITRA SEN*, a gem on the diadem of the world, repeatedly giving precious metals, not counted, it weighed, when he had constructed a house at *Kashi*, established in it pre-eminent Brahmana.

17. So generous, eloquent, and the shrine of valor and virtue—*MITRA SEN*, by whose name this fort is known, rebuilt the decayed *Chaitanya*, having erected a row of lofty temples. He located in them an image of *SIVA* under the name of *MITRESWARA*, and made a divine garden here surpassing the bower of paradise.

18. In the year 1688 of the era of the king *VIKRAMARKA*, that gem on the crest like the moon of the world, constructed the palace. Having constructed the building denominated *Mandira*, he located in it *URGHA*, the mother of the three worlds. These verses were made by the son of *KRISHNA DEVA*, known in the *Mithi* territory.

19. Like streams of nectar to gods, may these verses impart delight to virtuous men,—these verses of the poet *SIVA DEVA*, celebrated in the court at *Delhi*, born in the *Vaideha* province, a votary of *SRI KRISHNA*, contemplating as reality the three worlds.

20. Like a golden mountain with its ramparts, is the summit of *Indha*, whose palaces reflect the beauty of the nectar-fraught primary—the epitome of similes exhibited in composition according to the rules most approved in the universe,—abounding in bowers, dens, lakes, wells, and pools,—a land of plenty, dispelling worldly fear, where resided the Brahman *GADENDRA*.

21. May the virtuous be gratified—kings intent on the law—the subjects happy—and may there always be abundance.

Be there welfare and good fortune.

ART. II.—*On Camel Litters for the Wounded.*—By H. PIDDINGTON, ESQ.
*To the Secretary to the Government of India, Military
 Department.*

SIR,—I have to beg you will do me the honor to submit, for the consideration of the Honorable the President in Council, and, if approved, for transmission to the Right Honorable the Governor General India, the accompanying Memorandum and sketches. The importance of the subject to the interests of humanity, and to the movements of military force, will, I trust, excuse the intrusion of it upon his Honor's attention.

CALCUTTA,
 15th February, 1839.

I have, &c.

H. PIDDINGTON.

~~~~~  
*Memorandum.*

In the countries towards which the Army of the Indus is now advancing, it is nearly certain that no extra dooly-bearers for the carriage of the sick and wounded can be procured; and of even those taken with the force, it may be doubtful if they can be kept long together should the advance be prolonged far beyond the frontier. The sick and wounded then would, in this case, be left without the means of carriage, and not only many valuable lives might be so lost, but in important military operations might be greatly impeded, or even prevented. I found the other day, in the course of my reading, what appears to be so simple and cheap a plan of providing against this cruel aggravation of the miseries and losses of war, that I am induced to lay it before the Right Honorable the Governor General, not doubting that he will allow it a trial.

The plan I allude to, is in the “*Memoires de Chirurgie Militaire* of Baron Larrey,” a name standing so high in the annals of his profession for every talent and virtue which can adorn it, that nothing falling from his pen can be unimportant. I translate here the passage, which is found in vol. i. p. 278, of the “*Campagnes d’ Egypte*.”

Preparations for the campaign in Syria were ordered—

“The Medical Staff assembled to concert the necessary arrangements for their branch of the service in the army destined for this campaign. I was particularly occupied in providing every thing necessary to insure assistance to the wounded whom we might expect on such a painful and perilous expedition. The means of carriage were the first object of my attention, for merely dressing the wounded on the field of battle was



insufficient; they were moreover, to be placed out of the reach of the Arabs, and to be saved from the horrors of hunger and thirst, to which they would have been exposed if not promptly carried off. We had to employ for this purpose the camel—the only beasts of burden in the country; and to render the means of carriage easy for the wounded, as well as light for the animals, I had a hundred baskets\* made cradle-wise, two for each camel, which were carried, one on each side, suspended by elastic straps. They were so made that they did not in the least impede his paces, or his movements, and yet were long enough, by means of a lengthening flap on hinges at one end, to carry a wounded man lying down at full length.”

In adopting this plan, the simplest methods seem to be those most likely to succeed, and to be least subject to get out of order; and I should suggest that a few be made of basket-work—nothing is so durable as the entire ratan if it can be procured,—as well as some of the frame-work kind shewn in the drawing.

For the simplest sort a cradle-like basket, higher at one end to raise the head comfortably, and a tarpaulin for rainy weather, seem to be all that is necessary. The straps or slings for this, should, I think, be fastened to bent iron bars going *round* the cradle, (not fastened to the sides of it,) and turned into a ring at the *inner, upper* side, sufficiently strong and properly placed. A spare ring or two may be added when necessary for steadying the whole, and a short plank should be placed outside across the bottom, where the iron bars take, that they may not cut in upon the basket.

A frame of light wood, with a corded net-work bottom, should be placed inside, and a quilted mattress and covering; the last pretty wide, so as to be doubled if required, will be sufficient for the inside. There should also be two pillows, one for the head, and another to lay at the side, if required by the patient to steady himself against the motion of the animal.

Any intelligent officer accustomed to Camel-carriage will be able to arrange the lesser details of the necessary ropes, spare slings, &c. as well as the fitting of the curtain and tarpaulin, and a medical officer will easily add those necessary for the safety and comfort of the wounded and sick.

H. PIDDINGTON.

CALCUTTA, 12th February, 1839.

\* “*Paniers disposés en forme de berceau*” are the words used; though the Baron’s plate represents frames with curtains, which would have been expressed by the words “*Cadres avec des rideaux*.” Probably the plate may represent a better sort for the officers, and the Baron has forgotten to mention this?

## MILITARY DEPARTMENT.

*To the Officiating Secretary to the Government of India,  
Military Department, Calcutta.*

SIR,—I have had the honor of receiving and laying before Right Honorable the Governor General your letter No. 473 of the 2 ultimo, with its enclosures herewith returned, from Mr. Piddington submitting a memorandum, with sketch of a Camel litter for the conveyance of the sick and wounded in the Army of the Indus.

In reply, I am instructed to convey the expression of His Lordship's acknowledgments to Mr. Piddington for his useful communication, a copy of which will be forwarded to His Excellency Lieut.-General Sir John Kean, K. C. B. Commanding the Army of the Indus, for information.

J. STUART, Lt. Col

ART. III.—*Note by DR. KEAN of Moorshedabad, on DR. STEWART'S Table of Mortality among Hindu Females.*  
*To the Secretaries of the Asiatic Society.*

SIR,—The table furnished by Dr. Stewart, and published in the Journal of the Society for April last, may be expected to attract much attention. Its results are unexpected and startling. Considering the ignorance that prevails on the subject of Indian statistics, the unexpectedness of such information may be no argument against its accuracy; but the frightful mortality which the Table exhibits as arising from one source, will lead many to doubt its correctness, and all, to think that there may have been some error in the data on which it is based.

We learn from the Table that *one-fifth* of the female population of Bengal die in childbed. But we know that only a *portion* of the female population *can*, during any given period, suffer from this cause of mortality. This portion might perhaps, without involving much error, be estimated at *one-third* of the whole; and if so, a mortality amounting to *one-fifth* of the female population will be equivalent to *three-fifths* of the portion actually liable to that cause of mortality;—in other words, out of every *five* of the mothers in Bengal, *three* will die in childbed.

It is not however by arguments of this kind, nor indeed by arguments of any kind, that the truth of the Table can either be established or overturned. A census ought to be taken, and accurate

gisters kept, of such casualties as occur within the limits. A general census, though desirable, is not absolutely necessary on the subject.

In replying to the inquiries of the Secretary to the Prison Discipline Committee, the writer of this took the opportunity of suggesting the advantages that might be obtained from taking the census and keeping registers in particular Zillahs, or in limited districts around every Jail. It is obvious that such registers would have been available for many purposes, but the advantage then mainly insisted upon, was the facility that would have been afforded for comparing the mortality in the Jails, with that in the surrounding districts. It is understood that the suggestion was referred by the authorities to the Sudder Dewanny, who discouraged it, on the ground that it would lead to vexatious domestic intrusions. Convinced that the plan might be carried into execution without causing either vexation or annoyance, he selected a village containing 762 inhabitants, in the neighbourhood of the Moorshedabad Jail, and kept a register of the births and deaths for one year. During this period no death occurred from childbirth. Next year the register was made to include another village, embracing altogether a population of 2,778 persons, and during this period there was entered only one death in childbed. The registers for the first year were placed in the hands of your late Secretary by Mr. Adam, and are doubtless to be found among the papers of the Society.

These registers are not alluded to here as any authority on this subject, but merely as a practical evidence that they can be kept without causing trouble or inconvenience to any one. It is to be hoped, therefore, that Government will speedily institute measures for ascertaining the truth on this important question.

The above observations are by no means intended to convey the idea, that the mortality among native females from the cause assigned is not very great, on the contrary, it is believed to be excessive; nor is it likely to be otherwise till means are taken to disseminate among them something like information, and to introduce something like rational practice in reference to obstetric medicine. Yours truly,

MOORSHEDABAD,

A. KEAN.

11th October, 1839.

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Explanatory Note by DR. DUNCAN STEWART, Superintendent General of Vaccination.

Mr. Kean has very justly pointed out a blunder in the note which accompanied my Table, published in the April number of the Journal,

which certainly conveys to the reader the erroneous impression that all the 1328 cases of "childbed disease" were mothers.

I took the earliest opportunity in my power of rectifying this misapprehension which this gave rise to, as soon as it was pointed out to me, by addressing a brief note to the *Englishman* newspaper on the subject.

If you will do me the favor, in noticing Mr. Kean's letter, to refer him to the paragraph which I have marked in the accompanying printed copy of my Evidence before the Municipal Committee, and the annexed Table, he will perceive that the mistake has arisen from the careless omission of an explanation there given of the native term used to denote that class of diseases.

"The term employed to include all accidents of this nature, and applied indiscriminately to the infant and the mother, (*antari-rogi*) is one which attributes the fatal termination of such cases to demoniacal influence. It is not applied to casualties after the first month, and we may therefore conclude that the picture here given, distressing though it be, does not exhibit the total amount of suffering, and of death, caused by the barbarity, ignorance, and prejudices, of the Hindoos in their management of lying-in women. The number of still-born children is not given at all, nor is it, I fear, ascertainable. The picture is sufficiently frightful, which shows, as matter of fact, that of 1801 children who died during the first year of life, 1237 died from the accidents of childbed. Out of 88 mothers who lost their lives in childbed, four appear to have been so young as thirteen, two aged fourteen, six aged fifteen, and eight died between the ages of fifteen and twenty."

By reference to the annexed Table it will be seen that of the 1328 cases of "childbed" mortality, 1237 were infants under one year of age; and referring again to the Table in your April Journal it will be seen that most of these were not one month *ill*, and probably *not older*; 356 are stated to have died on the first day of illness; 308 on the second; 146 on the third, and so on. Neither the Table now sent nor the former has reference to the ratio of "mortality to population:" the imperfection of the census, which does not assign the ages of the *living* on any particular day, renders this impossible. The present Table exhibits merely the comparative prevalence and mortality of particular diseases, and the influence of these as affected by sex and age. The Table in the April Journal was drawn up from the same data, in order to discover the intensity of particular diseases, as evinced by their *duration*, before causing death.

Ages.	Fevers.	Small-pox.	Dysentery.	Cholera.	Spleen & fever diseases.	Pulmonic diseases.	Cerebral and nervous diseases.	Constitutional diseases.	Accidents & anomalous.	Childbed diseases.	Total.		Total.	Percentage of ages.
											Males.	Females.		
1 year,	276	41	126	86	5	7	10	3	10	1,237	983	818	1,801	9.005
2 "	152	21	195	75	13	6	4	10	10	3	251	235	489	
3 "	167	26	197	78	13	1	8	13	6	0	274	235	509	
4 "	87	30	127	75	5	2	1	5	2	0	181	149	330	
5 "	113	32	101	72	6	1	6	4	12	0	221	126	350	7.38
6 "	61	21	75	56	7	5	4	2	2	0	141	92	233	
7 "	66	17	65	57	9	1	4	5	7	0	112	119	231	
8 "	47	16	63	46	6	2	1	2	2	0	91	94	185	
9 "	49	17	45	30	8	3	3	1	9	0	101	61	185	
10 "	65	15	70	53	10	5	4	5	2	0	141	88	229	5.315
11 "	54	13	21	31	8	0	4	2	3	0	88	55	139	
12 "	84	21	59	66	19	4	2	3	9	0	150	120	270	
13 "	39	11	13	36	12	4	3	2	3	1	79	48	127	
14 "	86	7	51	41	13	5	4	3	5	2	122	96	218	
15 "	67	14	32	58	8	7	8	5	4	6	129	80	209	4.815
20 "	624	65	392	466	57	79	20	33	31	8	1,131	645	1,776	8.88
30 "	1,123	81	770	1,293	51	197	42	42	25	37	2,672	998	3,670	18.25
40 "	899	17	742	896	21	138	18	62	61	26	1,995	898	2,893	14.65
50 "	559	8	605	600	19	107	19	36	31	2	1,326	661	1,987	9.936
60 "	463	2	577	308	10	67	21	46	43	3	970	570	1,540	7.7
70 "	228	4	365	153	6	42	9	31	11	0	463	392	855	4.225
80 "	256	4	627	137	5	74	34	26	13	0	511	665	1,176	5.88
90 "	75	2	230	36	0	18	4	13	0	0	118	230	378	1.89
100 "	32	0	173	16	0	7	0	4	2	0	62	178	240	1.2
Totals, ..	5,672	488	5,733	4,773	311	792	233	361	309	1,328	12,317	7,653	20,000	100
47 per centage of diseases.	28.36	1.22	28.665	23.865	1.555	3.96	1.165	1.805	1.515	6.61	61.735	38.265		

With the assistance of Captain Birch in 1837-38, the Statistical Committee of the Asiatic Society registered the births and deaths of natives in Calcutta, and the following results were obtained at the end of twelve months; viz. number of Births—2,781, whereof males 1,656 females 1,142. Of the mothers, 46 died in childbed; and during the same year the number of children under one year of age reported to have died, was 585, of whom 260 died during the first month of life. If we may suppose these children to be the same as those born during the same year and same place, the mortality is frightful, viz. 1 in every 5 for the year, or 1 in 10 for the first month.

Compare this with the statistical report of the Clinical Hospital for Midwifery in Berlin, published in a recent volume of the *Lancet*. 2,656 labors, 1,913 children were born alive, whereof 92 died within the first month of existence, that is only 1 in 20.

The mortality among the mothers in the Berlin Hospital is not very different however from that in Calcutta; only 38 out of 2,656 died in childbed, in other words 1 in 67. If the Calcutta registers for 1837 are confirmed by farther observation, the mortality here is 1 in 60.

D. STEWART, M. D.

5th November, 1839.

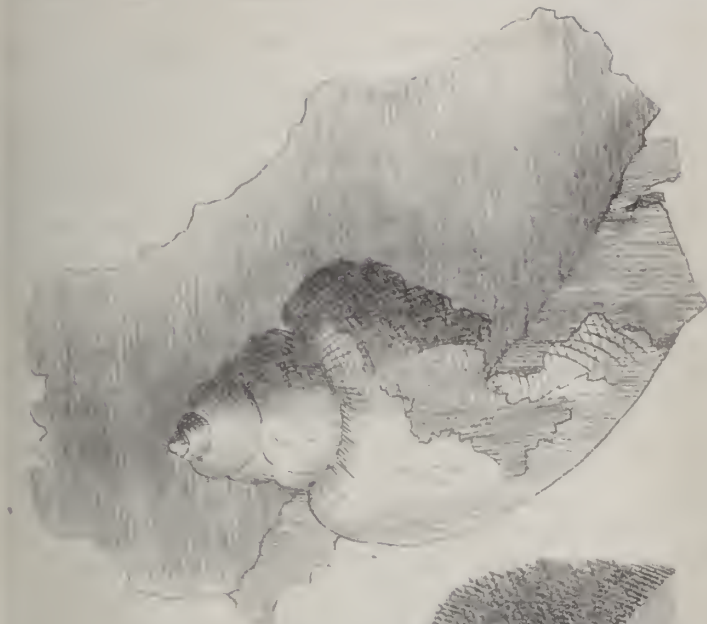
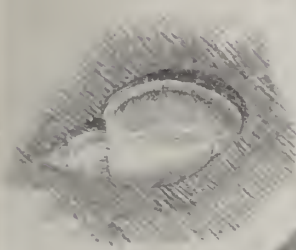
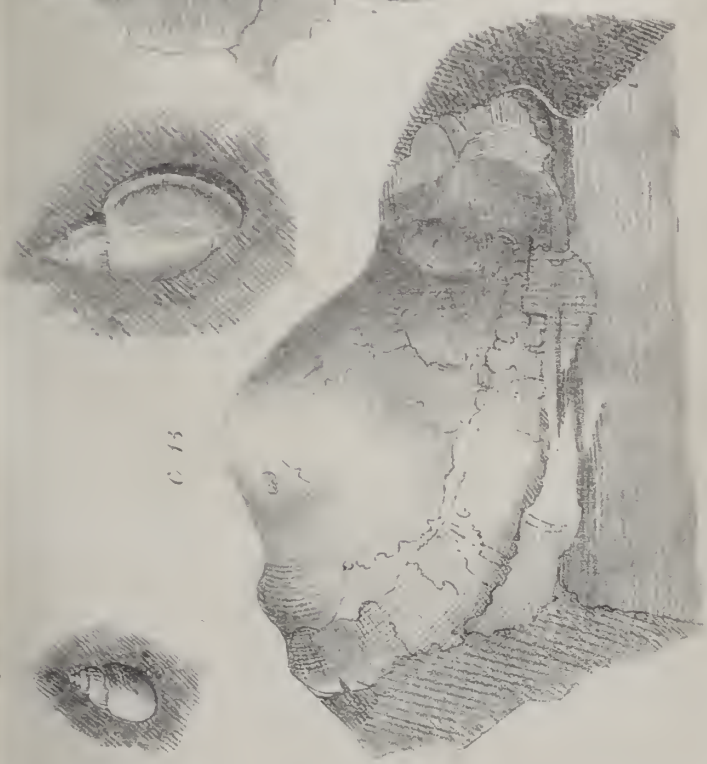
ART. IV.—*On fifteen varieties of Fossil Shells found in the Saugeen and Nerbudda territories.*—By GEORGE G. SPILSBURY, Esq. Surgeon, &c.*

Since the publication of my note on the discovery of the Fossil Shells near the Gour River, in the *Journal* for 1833, no notice has been sent of the children of that parent; and as I look upon myself now as a sort of Secretary for reporting Fossil discoveries of those more able, but not more willing than myself, I shall proceed to place on record a slight account of the localities from whence are derived the specimens I forwarded some months since.

On the arrival of Mr. Fraser, the Agent to the Governor General in these territories, in April last, that gentleman lost no time in making inquiries and sending out people in different directions; this led to the discovery of two other sites at no great distance from Suleya, viz

* This valuable paper was forwarded to Mr. Jas. Prinsep, in March, 1838, but was accidentally mislaid. We are now very happy in presenting it to our readers, together with facsimiles of Captain Reynolds' excellent drawings; and additional notes lately received from Dr. Spilsbury on the same subject.—EDS. J. A. S.

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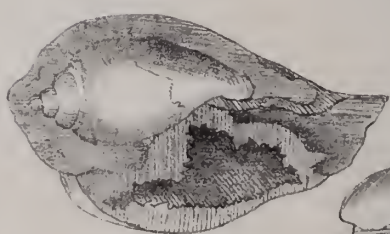
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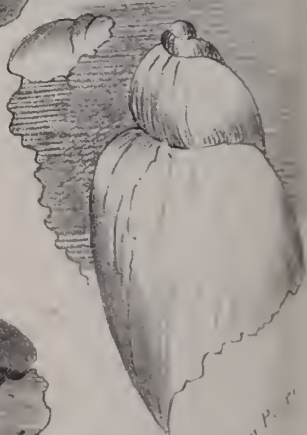
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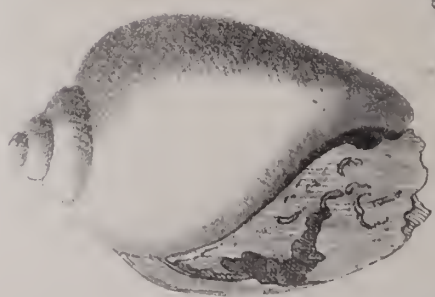


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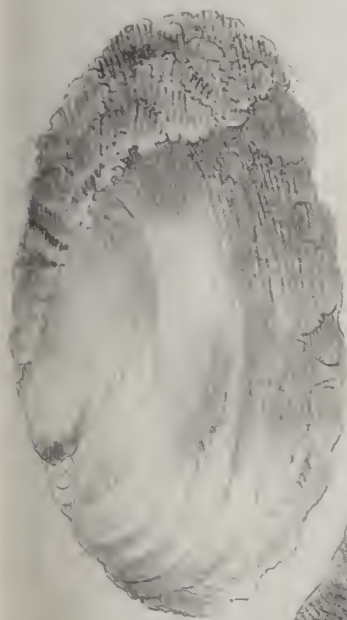
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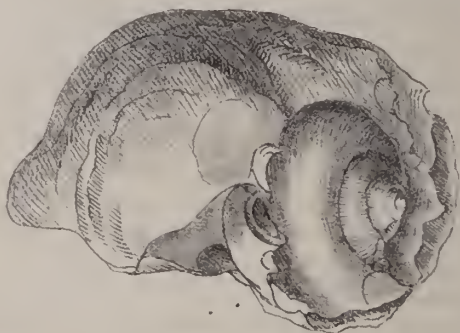
P. A. Reynolds — del.

Mundlap



1828

1828



1828



1828



1828

dhoonra and a village adjacent, only differing in colour from the first sent you, which were a reddish brown, and the others being white and of a more calcined appearance.

Some of these Shells being shewn to a native gentleman, he said, that he had heard similar ones were to be found in Scindea's country; and on Mr. Fraser dispatching a man to the quarter indicated, those called "Rae near Narwar" were brought in.

About this time I forwarded specimens to Major Ousley, who was then making the settlement of Betool, consequently surrounded by villages of the district, and on his exhibiting the Shells, several of these country gentlemen came forward and informed him, that similar were to be found in several places about the neighbourhood of Betool. The principal sites are Sussoondra to the east; Bhurkawara, Bhyawara, Jaora to the south; Budoree, Kolgaon, Gaekham, Bakore, to the south-west; and Moorkha to the east of Mooltaye.

The next site ascertained was a bluish coloured Fossil Shell of *Platystrophia* brought from Narainpoor, situated in the Sobagpoor Pergunah, north of the Nerbudda, and finally those sent in from Domadadur in the Ramgurh Raja's territory, south of the above river. For a knowledge of the two last sites we are indebted to the assiduity of Mr. Fraser in this most exciting pursuit.

I have also formerly sent specimens that were known to have come from near Mundla: our present circuit of the Agent to the Governor General, has enabled me to ascertain the site from whence they are derived; Phool Saugor, a village nine miles west of Mundla is the locality, in a nullah called by the cognoscent Sunkh Deyra, and on a hill close by the Shell Breccia and Fossil wood were obtained. From this place the only Bivalves (four in number) have been procured; two of which I forwarded to the Asiatic Society, and the remainder are in Mr. Fraser's collection.

Accompanying this notice, I send natural sized drawings (for which I am indebted to my friend Captain P. A. Reynolds, of the Madras Army,) of all the varieties we have now discovered.

- No. 1. Specimen of a Shell from Dhoonra.
2. From Phool Saugor, near Mundla. Those from Sussoondra, Gyekham, Bhurkawara, in the Betool district, are identically the same species.
3. From Narrainpoor, remarkable for the great breadth of the third whirl. Those from Rae Scindea's country and Domadadur in Ramgurh are similar.

4. From Moorkha, east of Mooltaye.
5. 5. Three varieties found in the Breccia from Phool Saug near Mundla.
6. The only specimen of the kind from Sussoondra, e of Betool.
7. Shell (imbedded in Breccia of the same kind) from Jac south of Betool. This and the two next specimens are not reversed, as all the others are.
8. 8. Two specimens from Phool Saugor, near Mundla, identical with No. 7 from Betool district.
9. 9. Two drawings to shew how curiously one Shell imbedded in the other. These are two very beautiful specimens, but the pencil cannot give any idea of the crystals at A A which add so much to their appearance.
10. Is delineated to give some notion of the very remarkable shape into which the shell has been compressed. Many brought in are almost flat, some have indentation exactly corresponding to another Shell but without any appearance of fracture or fissure so that at the time of the convulsion it must have been in a plastic state.

So ends my notes on Fossil Shells, chiefly found in the Saugor and Nerbudda territories, for the discovery of which, after my geological friend the lime-burner, we are indebted to the zeal and activity Messrs. Fraser, Ousley, and Ommauney.

The next communication will be on the dispatch of Fossils, that our late travels on the Nerbudda have produced; and for which you will be indebted to the above gentlemen, aided by their Secretary.

GEORGE G. SPILSBURY.

Camp, Source of the Nerbudda,
15th March, 1838.

*Supplementary Note on five additional varieties of Fossil Shells found in the Saugor and Nerbudda Territories.**

- A. A drawing of a Shell totally unlike any of the others, and yet only found at one site. Its great difference consists in the ribs or furrows so plainly shown in the specimen; the kind was found in March, 1838, on the 1st plateau of the

* Indeed the whole set, with exception of those from Rae, are so.

Mekul range of Hills, at the top of a steep trap ghat, on the high road from Sohagpoor to Umurkuntuk, near a village called Pureye;—the whole ground for some two miles was strewn with Shell Breccia.

- B. This is a drawing of a Shell also found at the same site, and is not a reversed Shell. This, and the specimens No. 7 and 8. 8. found at Mundla, and also Betool, are the only Shells whose whirls are twined as those of the present day are.
- D. Bivalves found at Phool Saugor and Mundla, and only a very few specimens have as yet been brought in. One similar was sent in from Mohtura Hill, (a branch I suspect of the Mekul Hills,) in the Ramgurrh Rajah's country, where the Domadar ones are found.
- E. Also a Bivalve, great numbers of which have lately been found in the Nerbudda near Jhansee Ghât, a fossil field which Mr. Fraser, the Agent of the Governor General, has brought to light, and of which I shall have more to say on forwarding some notes on fossils and sites from Hoshingabad to this.
- F. Another Bivalve intermixed with E., but as yet only a few have been brought in.

On referring to the plates of the Himalayan Fossil Shells attached to the Rev. R. Everest's paper in the xviii. vol. of the Society's Transactions, the only Bivalve bearing any resemblance to those under notice is fig. 13, Plate 1st. described as undetermined, which in general character has much the appearance of some found at Mundla, but ours are reversed. Plate 2nd. Bivalves, Fig. 26, b. the supposed *Unis* comes very near our F.—all the others are totally distinct.

The whole of the drawings are of the natural size, and I am indebted to the able pencil of Captain P. A. Reynolds, of the Madras Service, for their delineation.

JUBULPOOR,

11th October, 1839.

ART. V.—*Note on the River Goomtee, with a section of its bed.*—By
V. TREGAR, ESQ. *Jounpore.*

The accompanying section of the River Goomtee was taken about 20 miles (in a direct line) from its mouth, abreast of the village of Mye, at a time when the slowness and shallowness of the stream rendered the work one of neither labour nor difficulty. The depths were taken at every three feet, in a horizontal line perpendicular to the direction of the current, which runs here nearly due East. The rate on the 4th March last was one mile and 640 yards per hour—on the 13th June it was three miles an hour, and this latter I think the average velocity during the rains;—it is however sometimes much greater, probably nearly five miles, but at others much less, and occasionally when the Ganges rises much and suddenly, there is no current at all.

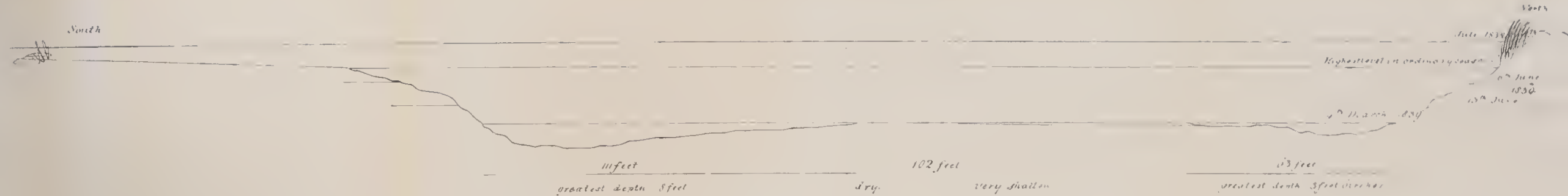
I have marked the highest level in ordinary seasons, but it sometimes rises considerably higher;—last year it overflowed both banks to some distance, destroying parts of many villages and overthrowing a number of houses in the city of *Jounpore*;—there, the road at the north end of the bridge was passable only by means of boats, and a large lake was formed between the city and the cantonments. No one remembers its having ever been so high; but it is somewhere said, that a fleet of boats once sailed *over* the bridge; the natives hereabouts have no tradition of so extraordinary an inundation, which, if it really happened, must have caused much destruction;—in fact, I think it questionable, whether the bridge could withstand the pressure to which it must have been subjected upwards and sideways, after the arches became insufficient for the passage of the water.

The water, although in appearance extremely muddy, contains but little silt, the quantity from a large portion being exceeding small in bulk, and not likely to weigh, when dry, more than a few grains.*

This river is navigable by the largest boats from about the end of June to the end of November, and by those of smaller size to *Jounpore*, and some distance beyond it; during the rest of the year also small boats, not too heavily laden, can I believe go up beyond *Lukhnow*, but the passage is, except in the height of the rains, a most tedious one, the distance by water being about three times that by land, for the river deserves its name of Goomtee, or winding. The traffic upwards

* Eighteen ounces by measure, gave seven grains only.

Section of River Goomtee.



P. Tregear



consists of stone-slabs and sugar mills from Chunar—saul wood from Borukhpore, and grain of all kinds from the latter place and Bengal;—downwards are sent sugar, and the indigo of numerous factories about Bounpore.

I send for the Museum* some fragments of glazed earthenware, found on a slightly elevated spot in this neighbourhood. Forty years ago the place was covered with dense jungle, and large burr and deepul trees—sufficient grounds for believing the absence of human habitations for a very long period. The Hindoos have been denied the knowledge of the art of porcelain manufacture and glazing, and I am not aware of specimens like these having elsewhere been found. As a Hindoo can use earthen vessels but once, it is most probable that a Moosulman village once stood where these pieces are found, and very likely the art came with those for whose service such vessels would be employed. It is, however, strange that the art should have been lost, for I believe it is no where known to the natives. The fragments are of a coarse fabric and rude workmanship, but the glaze is good, and the colours very bright, considering the time they have been exposed—probably two or three hundred years;—the blue is very bright, and seems to have been the favourite colour—the designs are not very elegant, and evidently neither Chinese nor imitations of it.

Agates and pebbles, cut and uncut, are also found, having been used I imagine in the composition of the glaze; or it may be for beads only, numbers of which are picked up. They must have been brought from a distance, as no stream producing them is to be seen on this side the Ganges, the nearest hills being opposite Benares. Could the common clay now used have been employed for the body of the ware? I fancy not, for it vitrifies and swells at a low heat, losing its shape, and adhering to whatever it touches. It is a great pity the art is lost.

V. T.

* Many will doubtless laugh to see them there. I was surprised, when a boy, to see in the British Museum pieces of broken glass vessels, neither handsome nor well made; but it was explained to me, that such things were valuable as specimens of the manufacture in its early days, and not according to their price as mere glass.

ART. VI.—*Memoranda relative to experiments on the communication of Telegraphic Signals by induced Electricity.*—By W. B. O'SHAUGHNESSY, M. D. Assistant Surgeon; Professor of Chemistry, Medical College, Calcutta; and Officiating Joint-Secretary to the Asiatic Society of Bengal.

There are few projects which at first sight appear so visionary as those which promise practical benefit to mankind through the agency of electrical operations. From the dawning of knowledge in this science, pretenders of every grade have found it a free field for their speculations: and hence perhaps it arises that the sober and practical part of society generally regard with distrust, the multitudes of projects which electricians are constantly advancing.

We nevertheless find that many eminent philosophers—whose habit of cautious research, have been proved by their numerous contributions to the mass of general science—such men as Brande, Faraday, Wheatstone, and Fox—are amongst the foremost, who predict many real advantages to the community from the application of the mysterious, though readily controllable forces which electricity places at our command.

I am aware that I am less entitled than many others to have my inferences from electrical data attended to with confidence, having at least on one occasion fallen into the error of indulging prematurely in dreams of useful results, and of reasoning unguardedly from the model to the machine. Still I believe that the experiments detailed in this paper, will be found to admit fairly of the consequences to which they seem to me to lead. They appear to me conclusive as to the perfect practicability of establishing, at a cheap rate, telegraphical communications, acting through electrical agencies, certain and infallible in their indications, perceptible alike by night and day, in all varieties of weather and season, and, lastly, so swift in their nature, that the greatest distances concerned bear scarcely any appreciable proportion to the inconceivably brief period in which the signal can be conveyed.

I was induced to institute the experiments detailed in this paper, by the statements I had read in several periodicals regarding similar attempts in England and the continents of Europe and America, and the actual patenting and adoption by the directors of the London and Birmingham railway of a similar plan by Professor Wheatstone, of the King's College, London.

Before entering into details regarding my experiments, which were carried on in the Botanical Gardens of Calcutta, during May of this

ear, it will perhaps prove interesting to give a rapid historical outline of the attempts which have been made to apply the various indications of the electrical fluid as the medium of instantaneous communication between distant places. For several of the following references I am indebted to an article by Dr. Steinheils of Munich, translated in the May number of Sturgeon's Annals of Electricity.

HISTORICAL NOTICE.

1.—*Telegraphs by common electricity.*

The first electrical telegraph on record was proposed by Winkler of Leipzig, in 1746. He employed a Leyden jar which was discharged through a single wire, a reach of the river Pleiss being included in the circuit. Le Monnier afterwards made a similar experiment in Paris, using a wire 12,789 feet long. In 1798, Betancourt laid a wire between Madrid and Aranjuez, 26 miles distant, to serve for the transmission of shocks by the Leyden phial. The pith ball electrometer was used by Lomand; and the sparks from tin-foil on glass surfaces by Reiser about the same period.

In 1826, Francis Ronalds, of Hammersmith, published a description of a plan in which two clocks were employed, one at each terminal station. Each clock had a moveable dial with twenty signals on its circumference. As the required signal letter presented itself, a spark passed at each station by the discharge of a Leyden phial. This plan, though comprising, as I will point out in the sequel, the true principle of a good system, was found useless in practice, as each sign was given out once in each revolution.

Such are the principal attempts hitherto made to effect the object in view, by means of frictional electricity. At the Meeting of the Asiatic Society of Bengal, of June 1839, M. Adolphe Bazin presented a project for effecting telegraphic correspondence by means of thirty insulated conductors passing between the terminal stations, each conductor representing a letter or number, so that by the rapid succession of sparks correspondence could be effectually carried on. With this M. Bazin connected an hydraulic apparatus for the conveyance of intelligence across rivers, and in other situations where frictional electricity might not be suitable.

M. Bazin's plans, although very ingenious, were altogether impracticable, and as we shall afterwards establish, demanded thirty conductors, where only one is actually requisite; moreover the impediments to the use of common electricity are absolutely insuperable in all countries (Bengal for example) visited by periodical rains or inundations.

M. Bazin indeed admitted this freely, when he found that not one of the electrical machines I placed at his disposal could by ordinary manipulation be made to evolve the least sign of excitement. But even effecting the excitement, which I have done by enclosing the machines within a glass case hermetically sealed, and supplied with air artificially dried, still it is impossible so to insulate the external conductors, as to prevent the dispersion of the excitement outside the apparatus.

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### § 2.—*Telegraphs by Chemical decomposition.*

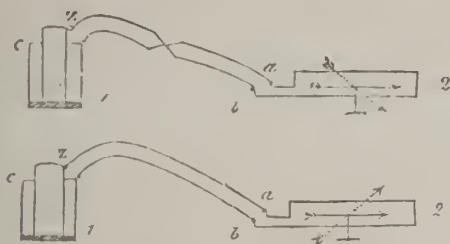
In Steinheils' historical sketch we find that Soëmmering, in 1807, employed a voltaic battery provided with thirty-five conductors, each terminating in a gold pin set in a tube; on completing the connexions the water is decomposed and the ascent of bubbles of gas indicates the signal. This system is, however, only available for very short distances, as the decomposing power of the termination of any pair of conductors, the diameter being the same, diminishes rapidly by lengthening the wire. The law of the diminution, Ritchie has attempted to establish, but his experiments are not considered to be conclusive; its rapidity may be shewn by an experiment I performed in 1839. A voltaic battery, the conductors of which were *six* feet long, decomposed water to the rate of forty cubic inches of oxygen and hydrogen gases in three minutes. Conductors of the same diameter, but *thirty-six* feet long were next employed; the battery then only evolved twenty-five cubic inches of the gases; with wires of 200 feet only eleven inches were obtained; still the battery was constant in its action, for with the original conductors at the close of the experiments it still gave forty cubic inches. Again in the experiments at the Botanical Garden in 1839, no chemical decomposition—even of the most yielding of all compounds, the ioduret of potassium—could be performed at the termination of one and a half miles, whereas other manifestations of electrical action were readily procurable at the termination of twenty-one miles of wires.

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§ 3.—*Telegraphs by volta-magnetic deflection.*

The next method employed is the deflection of the magnetic needle by voltaic or magnetic electricity. I may remind the general reader that whenever electrical vibrations occur in exceedingly rapid intervals in an insulated wire surrounding and in the same direction with a balanced magnetic needle, the needle is deflected, either east or west according to the order in which the ends of the surrounding coil are

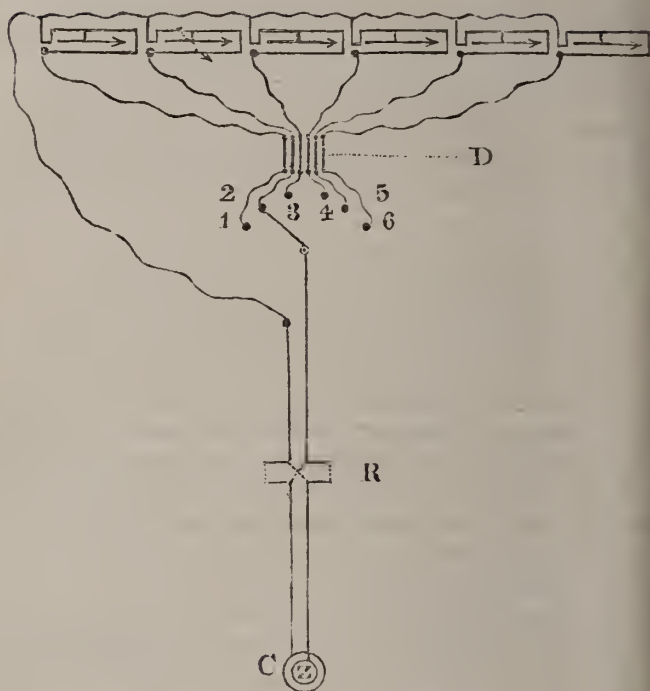
nnected with the source of electrical excitement. As I am now writing for popular readers I may be pardoned by the adept for illustrating this interesting fact by an explanatory diagram.



In this diagram, 1 represents the voltaic couple; z zinc; and c copper; 2 shews the magnetic needle on its stand in the magnetic meridian, with the surrounding coil of wire, with its terminations a and b . In the first the wires cross, or that from z proceeds to b , that from c to a , and the deflection accordingly is from north to west. In the second the wire from z proceeds to a , that from c to b , and deflection of the needle is from north to east.

Thus with two wires we can obtain two signals only, but one wire may belong, or be common to any number of galvanometers, so that from three wires we can obtain four signals; from four wires six signals; from five wires eight signals; from six wires ten signals; eight wires fourteen signals; ten wires eighteen signals; twelve wires twenty-two signals; fourteen wires twenty-six signals, or the alphabet.

In the following diagram six galvanometers are represented connected with seven wires, one being common to all. The six wires run any distance in a bundle, and are best insulated by silk or resin from each other. The ends of the wires then proceed to little cisterns of mercury, disposed in a circle. From the centre of the circle a moveable wire proceeds as a radius, which may be moved to any of the cisterns 1, 2, 3, 4, 5, 6. To this centre proceeds one of the poles (z) of the voltaic couple—and to the termination of the common wire, proceeds the second pole of the couple c .



In the diagram the connexion is made with No. 2, and the dotted line shews the deflection of the needle—and this deflection may be reversed by crossing the course of the battery wires, as shewn at R. The five parallel lines at D shew the conductors, which may be indefinitely prolonged.

Thus by a move of the *radius wire* to any of the cisterns we can deflect the needle at the corresponding galvanometer; and by a move of the cross wires we can reverse the deflection at our pleasure.

We have here a combination which affords sufficient numbers for spelling, numbering, dictionary and cypher signals. Even four galvanometers which can be worked by five wires, will afford the necessary combinations for every description of signals.*

* This telegraph has been actually laid down between London and Drayton, and is to be carried on to Bristol. Though extremely ingenious, I shall presently prove that the railway itself without any special conductors, or at most with one wire, is a perfect telegraphic line.

In Davy's telegraph the needles carry slight screens which conceal illuminated letters or numbers—on deflecting the needle the signal is disclosed.

Soon after the discovery of the deflection of the needle, several attempts were made to establish by its use, the laws of action of the battery. Ritchie attempted to prove that the deflection was in the direct ratio to the surface of zinc acted on in the battery. Thus supposing the conductors unchanged, and that by the corrosion of one superficial inch of zinc a deflection, say of 5° be obtainable, the corrosion of two superficial inches will give a deflection of 10° . Were this assertion supported, a single galvanometer would give us all the signals we could require. It is now however proved that the supposed law by no means holds good. It is quite true that we may double or treble a given deflection, or that we may by direct experiment proportion the voltaic force to the deflection required, but such experiments are only fit for performance in the closet or laboratory,—require such careful adjustment and observation—and are, moreover, so exceedingly delicate, and take so much time in recording, that they become quite unsuitable for the rapid transmission of telegraphic signals.

In the preceding arrangements in which several galvanometers were used, we have manifestly all that we require within the distances to which experiment has yet reached. But the expense of wire next presents itself as a motive for endeavouring to improve the system by diminishing the number of the wires. To render this intelligible, of the copper bell wire best suited for these experiments, each mile costs 76 rupees.

Steinheils of Munich, the most recent writer on this subject, proposes either of two very ingenious methods. The first is causing the galvanometrical needle to terminate in a fountain pen, the tip of which touches and marks a strip of paper revolving by clockwork ;—according to the number of dots a letter or numerical signal can be obtained. The second plan is the employment of the tip of the needle to strike a bell, when the number of strokes in a given time afford the requisite signal.

The galvanometer moreover has been rendered so exceedingly delicate in its indications, that very feeble electrical forces will succeed in producing deflections. The electricity evolved by holding up the hand before a disk composed of bismuth and antimony, caused in an instrument contrived by Dr. Page, of Baltimore, a deviation of fifty degrees. In a galvanometer in my possession, constructed by Messrs. Watkins and Hill, the action of a drop of acidulated water on a zinc wire the size of a pin, and opposed to a copper element of equal size, urges the needle through a quarter of a circle. Moreover the differen-

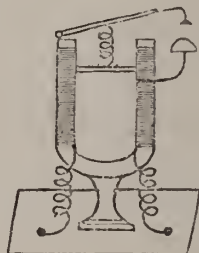
tial principle so successfully applied by Häuy to the discovery of magnetism in minerals containing traces of iron, can be had recourse to here so as to enhance still further the delicacy of these beautiful instruments.

Having thus sufficiently exposed the construction and mode of action of the galvanometer, I must reserve for another place, the results of my experiments in testing the value of the different methods described.

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 § 4.—*Henry's Magnetic Telegraph.*

I have still however to notice another proposal which has attracted great attention, and is said, on good authority, to be in course of practical application in the United States.

Professor Henry proposes to employ the sudden development of magnetism, occasioned in a horse shoe bar of soft iron while surrounded by a spiral of insulated wire, the extremities of which are in contact with a voltaic couple. The magnet thus created attracts a light piece of iron which carries an arm. The arm when attracted marks dots on a revolving cylinder, or may strike a bell. The arrangement is shewn in the following figure. The spiral wire in the centre is a spring lift up the arm on the cessation of each stroke.

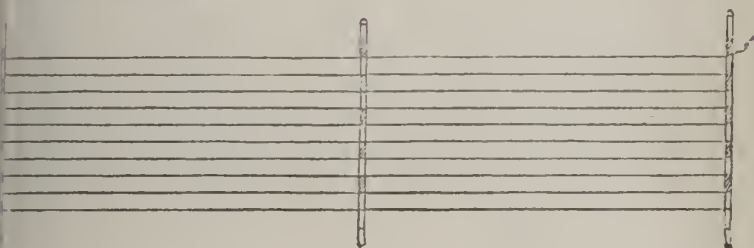


Eleven miles of wire were employed in one of Henry's experiments but the wire was coiled spirally round a drum, a circumstance which considerably invalidates the results. This will seem sufficiently intelligible by reference to the construction of the "coil electro-magnetic machine," described in a subsequent page.

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 § 5.—*Experiments by the Author.*

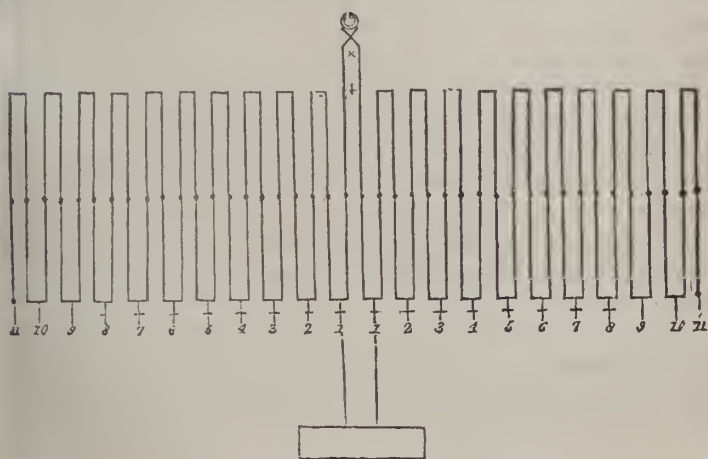
I have now given an adequate sketch of the several methods of communication hitherto proposed, and I proceed to the description of the experiments I have carried on, in the view of testing the comparative merits of the preceding plans and of another, which I have myself devised.

My first object was to construct a line of wires of sufficient length to afford practically valuable results. With Dr. Wallich's liberal aid a parallelogram of ground, 450 feet long by 240 in breadth, was planted with forty-two lines of bamboos. Each line was formed of three bamboos firmly driven into the ground, fifteen feet in height. Each row was disposed so as to receive half a mile of wire in one continuous line, thus,*



The strands of wire were one foot apart from each other. As each row was laid down, it was carefully coated with tar varnish.

A tent was pitched in front of the entire line, and the connections of the wires were so established that in the course of half an hour it could be tested from centre to the extreme flank, so as to ascertain the effects of lengths of wire, varying from one to eleven miles at either side, forming a total circuit of twenty-two miles. This may be perhaps more readily intelligible from the subjoined figure.



* Eleven lines should have been shewn in this drawing.

The cross lines above the numbers exhibit the wires led from each half mile of conductor. Thus by cutting through 1. 1. the next numbers to right and left became the conductors or nearest electrode and the length of the circuit thus rose from one to three miles; cutting 2. 2. will make 3. 3. the electrodes, and increase the circuit to five miles, and so on, each section added a mile to the circuit at either side.

The wires employed were of iron (annealed), diameter one-twelfth of an inch. It is almost needless to observe that iron was used not from choice but necessity. A sufficient quantity of copper wire was not procurable in Calcutta, no draw-bench was ready to manufacture the necessary supply, moreover the rainy season was fast approaching when such experiments could scarcely be attempted, constant exposure in the open air being essentially requisite to success. The expense again of copper would have amounted to much more than a private individual could afford.

With iron wire however I considered that the results would be still of much practical value. Being the *worst* of the metallic conductors of electricity, it seemed a reasonable inference that whatever might be found practicable with iron, would *à fortiori* be so with the copper or best conductor.

On the completion of the line the following instruments were tried

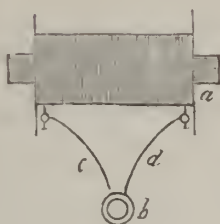
1st. An electro-magnet of soft iron, $1\frac{1}{2}$ inch in diameter, poles 1 inch apart, length from centre to poles 12 inches, weight 14 lbs surrounded by one hundred yards of insulated copper wire, the twelfth of an inch in diameter. This electro-magnet, when excited by the voltaic battery used in the subsequent experiments, with conductors seven feet in length, supported 240 lbs.

2nd. An electro-magnet of very small size, constructed by Watkins, of London, capable of supporting 30 lbs. with the battery now referred to, and with the same length of conductors.

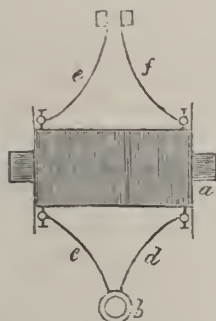
3rd. An astatic galvanometer by Watkins and Hill, already referred to.

4th. An electro-magnetic induction machine, also by Watkins, of which a brief description is desirable.

This instrument consists of a coil of thick wires insulated by silk, and wound spirally round a wooden cylinder having a hollow axis one inch in diameter. The ends of this coil are connected with metallic screws, so that they can be joined to the poles of a voltaic battery.



Around this primary coil is wound a second coil of extremely fine wire, also insulated and 1000 yards long, totally unconnected, though in close juxtaposition with the primary coil, the ends of the wire being led to screws to which handles, directors, &c., can be attached, thus,



Into the hollow axis at *a* is introduced a bundle of insulated iron wires.

The action of the instrument may be very briefly described. While the battery at *b* is in contact with the wires *c d* the primary coil is excited. By interrupting the circuit at *+* or elsewhere, at the instant of its interruption, the secondary or external coil becomes excited by induction or proximity—and this excitement is augmented by the influence of the magnetism simultaneously annihilated in the central bundle of iron wire.

The electrical state thus momentarily generated in the secondary wires, may be rendered evident by the production of a spark and shock, by effecting chemical decomposition and all the other signs of electrical action, at the terminations of the secondary coil *e, f*.

In this cursory description I confine myself to facts alone, and refrain from entering on any theoretical speculation as to the cause of these singular and deeply interesting phenomena.

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*Experiments with the Electro-magnet No. 1.*

The day being fine, the ground and bamboos perfectly dry, 9. A. M. the sustaining power of the electro-magnet No. 1. was tested with iron conducting wires ten feet long, and found to amount to 46 lbs.

With one mile of same wire,  $\frac{1}{2}$  mile at each side,

|                             |                                     |
|-----------------------------|-------------------------------------|
| it supported, .. ..         | 18 lbs.                             |
| 2 Miles of wire, .. ..      | 8 lbs. with difficulty.             |
| 3 Miles of wire, .. ..      | $2\frac{1}{2}$ lbs.                 |
| 4 Miles of wire, .. ..      | 23 ounces, with difficulty.         |
| $4\frac{1}{2}$ Miles, .. .. | sustaining force ceased altogether. |

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Electro-magnet No. 2.

With 10 feet wire,	12 lbs.
— 1 Mile,	7 lbs.
— 2 Miles,	3 lbs.
— 3 Miles,	$0\frac{1}{2}$ lb.
— 4 Miles,	no sustaining power

Assuming iron to be inferior to copper in about the proportion of 1 to 10 according to Sir Humphry Davy and Becquerel's standard of conductivity, this experiment shews that for equal diameters of wire, copper would convey the signal by Henry's method to about twenty-one miles in an imperceptible period of time. This distance might be extended by enlarging the diameter of the wires, but to what limit, is as yet unknown.

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*Experiments with Galvanometer.*

The astatic galvanometer was arranged and levelled with much care, the needles retaining a very slight degree of directive force so as to cause them to swing in the magnetic meridian.

At 1 Mile, deviation maximum or .. ..  $90^\circ$   
The needles being restrained by pins at the quadrant:—

|                                                                   |                     |
|-------------------------------------------------------------------|---------------------|
| At 2 Miles. .. ..                                                 | $90^\circ$          |
| — 3 Miles. .. ..                                                  | $75^\circ$          |
| — 4 Miles. .. ..                                                  | $63^\circ$          |
| — 6 Miles. .. ..                                                  | $40^\circ$          |
| — 10 Miles. .. ..                                                 | $11^\circ$          |
| — $11\frac{1}{2}$ Miles at each side to total circuit 23 miles. } | barely perceptible. |

Up to the sixth mile the needles were deflected with great rapidity the connexion being made with the voltaic element. The reversal of the order of connection also satisfactorily reversed the needle from east to west, and the contrary. But when the deflection fell to below  $10^\circ$ , the movements were exceedingly sluggish, so that on an average two seconds elapsed before each signal could be read off. The change of battery poles then often failed in reversing the direction of the needles—and here, as before, at least two seconds were consumed in each movement. Applying the same rule to this as to the preceding experiment, the galvanometer would convey signals by a copper wire to a distance of twenty-eight miles—and this might be increased by enlarging the wire or the battery, or by adding to the delicacy of the galvanometer—but in one essential point this system was deficient, namely, in rapidity of movement. Two seconds or even *one*, on each telegraphic movement, would be an extravagant waste of time compared with the celerity with which signals can be conveyed by another method.

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Chemical decomposition.

One of the most delicate of all tests of voltaic electrical action is the decomposition of ioduret of potassium and the production of a blue colour which the free iodine strikes with starch. This effect was produced in my experiments for a line of three miles of wire. Beyond this no decomposition could be effected. From this fact we are entitled to infer the impracticability of Soëmmering's method. See § 2.

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#### *Induction machine, and mode of correspondence by Pulsations and Chronometers.*

The battery was connected with the primary coil see fig. 1. p. 723. by very short wires;—the ends of the secondary coil wires screwed to the right and left wires of the great parallelogram. P. 721.

On breaking contact with the primary coil, a shock utterly intolerable passed at half a mile to an individual holding the metallic handles in which the wires ended.

To avoid fatiguing details I may at once state, that by this secondary coil, excited by but three small voltaic couples, the shocks up to seven miles were exceedingly smart—at eleven and a half at each side, they amounted to no more than strong, but not disagreeable, sensations. I think these might be best termed “pulsations,” for to the *hand* they impart the same feeling proportionately, that a strong and full pulse does to the *finger*.

Each pulsation is practically simultaneous with the breaking contact with the battery. To give a rude idea of the velocity of the signal, the contact being broken by a clicking wheel, on a perfect calm morning, at a distance of but sixty yards, the pulsation was invariably felt at a sensible interval before the click which preceded it was heard. Thus sound travelling at the rate of 1090 feet in one second—to 121 feet in one-ninth of a second, the electrical impulse passes through a total circuit of twenty-two miles, in less than that practically insignificant fraction of time. This however conveys but an erroneous notion of the almost inconceivable velocity of the impulse. Professor Wheatstone has proved that the electrical accumulation of the Leyden phial is discharged and circulates through copper conductors, or fifteenth of an inch in diameter, with greater velocity than the progress of light through the planetary spaces, and in the rate at least of 288,000 miles in a second. Now the discharges of the Leyden bottle and those of induced coil electricity are in the closest circumstances analogous to each other.

Of the pulsations thus transmitted, it is perfectly easy to count six in one second—thus with a little practice any signal number can be made from one to six in one second.

Besides the simple repetition of the pulsations up to nine, beyond which they become indistinct for each signal, there are at least two modes of conveying other sensations by this apparatus. If the connexion between the battery of the primary coil be made and broken by a ratchet-wheel of brass and silver, and the wheel be turned pretty rapidly a sensation analogous to the ruffle of a drum is so distinct as to render mistake impossible. A third set is obtained by interposing a flat file in the battery circuit, and interrupting this by drawing one wire along the surface of the file; here instead of the ruffle, the feeling is that of a blunt saw drawn lightly across the palms of the observer's hands. It is difficult to express in words the differences in these distinguishing signals, but the practice of a quarter of an hour will make the observer so familiar with them, that he can without the slightest difficulty carry on a communication by numbering or spelling with his distant correspondent. With a tithe of the practice of a pianist or harpist, the most perfect sympathy is practicable between the signalists, and that as fast as the signal can be spelt. In short, with but little less velocity than the articulations of language or the writing of stenographic characters this silent, but thoroughly intelligible, and still most secret of all correspondence can take place.

It is almost unnecessary for me to remind the reader of the admitted

act, that the exquisite delicacy of the impressions of the touch transcends, in some respects, the evidence of all the other senses. The eye and ear are liable to distraction by casual sounds or phenomena, while the attentive touch knows no interruption. The eye must close momentarily and thus lose the observance of many rapid phenomena. Dazzled by too vivid lights, and confused by too constant watching, vision soon ceases to be accurate, while the frequent repetition of similar sounds either becomes absolute silence to the ear, or like the murmuring of a rivulet or the humming of insects, gradually narcotizes the observer. Let the experimentalist attempt to count but 200 rapid strokes of a tint bell, and he will at once acknowledge the imperfections of any acoustic method.

Thus with copper conductors equal in diameter to the iron wires employed, signals by pulsation are proved to be communicable by the method above described, in less than any appreciable period of time, to the distance of 154 miles.

Besides the method of telegraphing by pulsations and other signals recognized by touch alone, there is another of which I have made extensive trial, and which is capable of affording still more accurate and intelligible and equally rapid results.

Without any knowledge of the experiments quoted by Steinheils—many months indeed before the paper by that author was published in England—I attempted, and with success, to effect the transmission of signals by using time-keepers at each terminus, and causing the pulsation to be felt as the hands simultaneously passed a certain number or letter on the dial.

In these experiments I first employed a pair of watches modified for my use by that ingenious artist Mr. Grant, of this city. All the movements were taken out but those connected with the second-hand, and the long lever was so constructed as to check the balance-wheel at measure during the recoil. Round the second-hand was placed a card dial laid off with three concentric circles divided each into twenty parts. Omitting vowels and superfluous letters, the alphabet was laid down in each circle so that the hand would during each revolution point to any letter three times; the compartments were moreover numbered on the same principle, so that each figure from one to ten would be pointed to six times in a revolution.

The hand is passing each compartment during three seconds. The observer receives say two pulsations, and is thereby referred to the second circle, and reads the letter or cypher, according as the signal is for spelling or numbering.



Although the watches were of the very cheapest kind, and would not keep time together for more than five minutes, still they were quite sufficient to enable a correspondence to be carried on. Thus signal seldom lasted longer than three minutes; both watches were then allowed to run to No. 1 or zero, and stopped. To renew correspondence a prolonged roll was communicated. If but one roll, it indicated spelling; if two, numbering. On the roll ceasing, three pulsations at intervals of one second were passed, and at the third the correspondents started their watches.

The pendulum was also tried, and with decided advantage. The German clocks sufficed to demonstrate the practicability of the system. The striking parts were removed, and also the hour and minute hands and dial.—To the axis of the escapement wheel a needle was attached carrying a light hand which indicated on a dial the signals above described. The German clocks (which cost but 16 rupees the pair) in numerous experiments beat together for several hours, and could always be relied on for one hour at least. It is almost needless to add that by shortening or lengthening the pendulum the rate was readily varied from 40 to 80 seconds for each revolution.

I did not omit chronometers, although I could not of course so alter these costly instruments as to adjust them perfectly to my experiments. It is obvious however that chronometers will on my method give an unerring and constant mode of telegraphic correspondence. In recent trial at Greenwich the mean error of several instruments one year was but two seconds!\* Here then are two movers constantly and simultaneously pointing to one and the same signal, be it letter, figure, or cypher. The electric pulsations which “take no account of time” or distance, supply us with the means of converting this synchronism to the unexpected and invaluable end to which it is now proposed to be applied.

Even employing inferior chronometers, the addition of a movable dial which could be adjusted daily on a method too simple to need description, would secure the perfection of the correspondence; or the daily difference of the instruments being known, a tabular correction could be made; or, lastly, by an occasional astronomical observation of true time at each station, the object in view could be as certainly obtained.

\* In 1831, the first three prize chronometers only differed  $\frac{19}{100}$  of a second in a year.







§ 6.—*Water a conductor of Pulsation Signals.*

During the preceding series of experiments, I had ample proof of the great conducting power of water for this form of electrical impulse. Shocks or strange thrilling sensations were perceptible at every step while proceeding through the ground, as long as the morning continued damp. When, however, the sun became sufficiently powerful to dry up the dew, and remove the film of water from the wires, bamboos, and grass, then the wires alone conveyed the electricity. My experiments convince me that dry wood, earth, and masonry are perfect non-conductors of this kind of excitement. Even the bark of living trees seems a perfect insulator.

Some months previous to the experiments now described, I accidentally found too (by the falling of a wire into the large tank at the Medical College) that when water was available, only one insulated wire was requisite for completing communications. I did not omit the opportunity afforded by my experiments at the Gardens of following up this curious result, and although I find the fact has also attracted the attention of Professors Henry and Steinheils, these philosophers will, I feel convinced, learn with interest the simultaneous pursuit of the like subject, in my humble investigations.

In one experiment the electro-magnetic machine was stationed at the ghât of Bishop's College, and one of its wires, but twenty-five feet long, dipped in the Hooghly at the ghât. The second wire ran along the dry path round through the Botanic Gardens, and terminated in Dr. Wallich's library. A wire led from the river at the ghât before Dr. Wallich's house, also into the library. The assistant stationed at the machine was directed to make the signals in the usual manner. Every signal told in the library without any notable diminution of effect.

It made no perceptible difference whether the tide was ebbing or flowing;—in several trials the damp mud even conveyed the signal unaltered in force or character.

The distance by water in the above experiment was 7,000 feet. In a second set of trials the machine was placed at Sir John Royd's garden, the water distance intervening being 9,700 feet, and with the same results as before. (*See lithographed plan No. 1.*)

In a third trial, seven miles of wire were disposed round the trees of the Garden, taking in its entire boundary—starting from Dr. Wallich's house and terminating in the river at Howrah; a second wire was carried from the river, at the west end of the Garden (two miles

of the Hooghly being interposed) and proceeded to the north extremity of a nullah 3,000 feet in length; from the south end of the nullah we returned to the library. Thus we had altogether eleven miles of metallic and 13,256 feet of water circuit, the latter in two interruptions. The signal still passed as intelligibly and strongly as before. A lithographic plan is annexed in illustration of these details.

§ 7.—*General remarks on the applicability of the preceding facts.*

I reserve for another occasion the description of several experiments which these facts led to, regarding the possibility of dispensing altogether with metallic conductors; and I now proceed to shew some practical circumstances, expenses, and other details regarding the application of these facts to the actual accomplishment of telegraphic correspondence.

To effect a perfect system of telegraphic communication for a distance, say of 500 miles, two wires are at most required; where a river passes between the termini, but one wire is necessary. If the water communication be the sea, the distance for which one wire will suffice will be at least quadrupled. Insulation of one wire is necessary. The wire may touch dry substances of any kind, but it must not come in contact with water or damp earth communicating with the second wire or with the river course.

Insulation according to my experiments is best accomplished by enclosing the wire (previously pitched) in a split ratan, and then paying the ratan round with tarred yarn—or the wire may, as in some experiments recently made by Colonel Pasley in Chatham, be surrounded by strands of tarred rope, and this by pitched yarn.

An insulated rope of this kind may be spread along a wet field or may, even led through a river, and will still conduct without an appreciable loss the electrical signals above described.

In establishing a communication it would be advisable to bury the wire about two feet below the surface of the ground, in a narrow trench well rammed with pounded brick and mortar. At every ten miles the wire should rise through the ground in a masonry pillar, to allow of verification or of the discovery of the situation of accident. In India the Police Thannah houses might be conveniently used for this purpose.

The expense of copper wire per mile would be 272 rupees; of insulation 20; of trenching and masonry I can form no accurate estimate.

As no intermediate stations would be required, the expenses of establishment would be very trivial.

The cost of a magneto-electric machine of the maximum power would not exceed 20*l.* The galvanic apparatus, constructed on the principle I described in 1837, would not at most cost 10*l.* and would probably cost 5*l.* per month for its constant support.

In Europe or America there exists no difficulty whatever to the adoption of this system of correspondence. In India unquestionably the obstacles are greater. Perhaps, however, on the other hand the very wildness of our jungle tracts would rather protect than endanger the buried wire. If properly laid down, in a few months none but those constructed, could find it. But wherever a railroad exists, there this method can be at once adopted. Indeed its applicability is so certain and fallible, its principles so simple, that I often wonder it has not been previously employed or even announced, and that the justly celebrated Mr. Wheatstone should have taken out a patent for a five-wired telegraph when every railroad in England already gives the required conductors.

The progress of science is hourly adding to the catalogue of triumphs effected by the sagacity of man over the seeming impossibilities of nature. Our own day has witnessed the miracle of gas illumination—the discovery of precious metals in potashes and in common salt—the extrication of the electric spark through the influence of magnetism—the solidification of carbonic acid—the fixing by the sun's light of the pictures it forms whether by shadow, reflection, or refraction. A conquest still greater than all which I have quoted would be the annihilation of time and space in the accomplishment of correspondence. That a signal can be passed between places 1,000 miles apart in less time than the motion of solar light through the firmament, is no less startling to assert than it is demonstrably and practically true.

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ART. VII.—*Extract from a Memoir on the Preparations of the Indian Hemp, or Gunjah, (Cannabis Indica) their effects on the Animal system in Health, and their utility in the Treatment of Tetanus and other Convulsive Diseases.*—By W. B. O'SHAUGHNESSY, M. D. Professor in the Medical College of Calcutta, &c. &c.\*

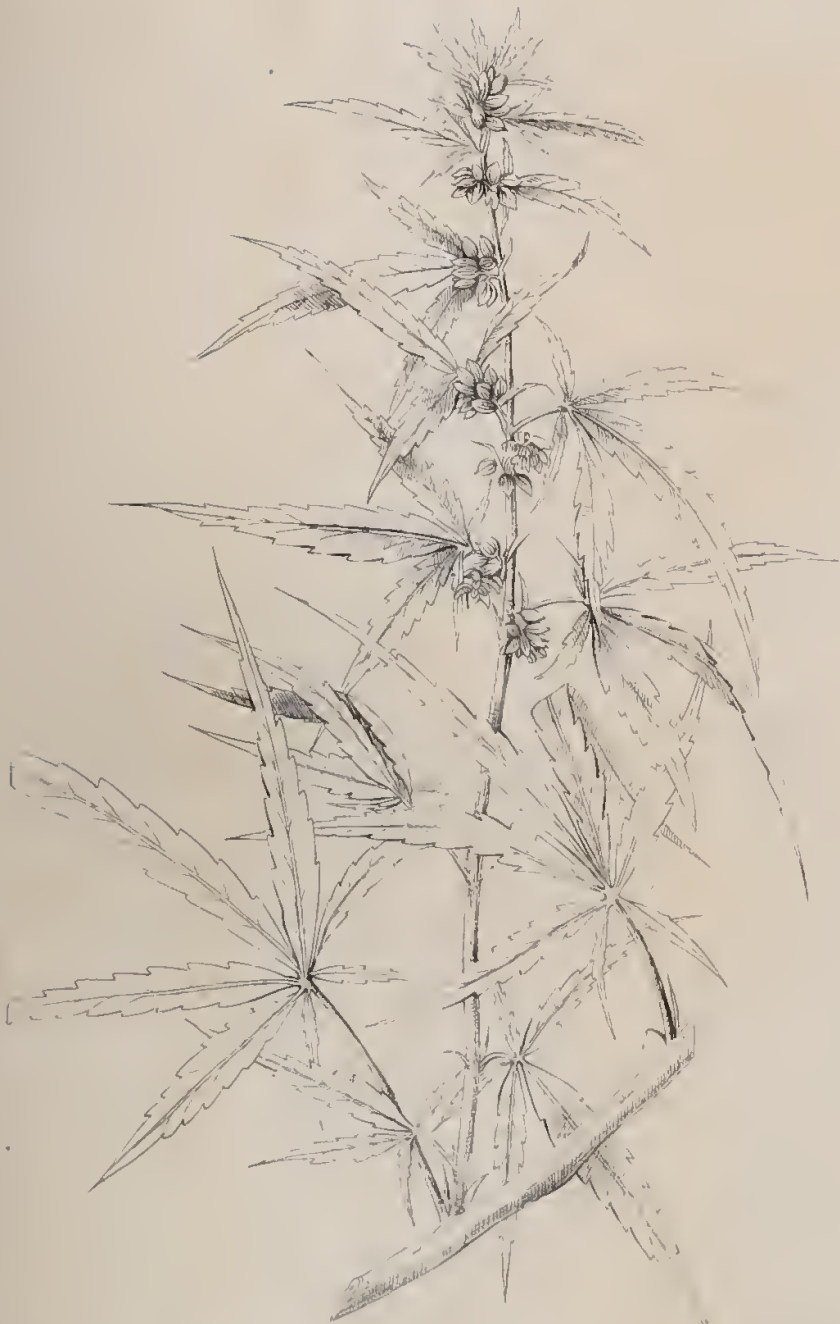
The narcotic effects of Hemp are popularly known in the south of Africa, South America, Turkey, Egypt, Asia Minor, India, and the adjacent territories of the Malays, Burmese, and Siamese. In all these countries Hemp is used in various forms, by the dissipated and depraved, as the ready agent of a pleasing intoxication. In the popular medicine of these nations, we find it extensively employed for a multitude of affections. But in western Europe its use either as a stimulant or as a remedy, is equally unknown. With the exception of the trial, at a frolic, of the Egyptian "Hasheesh," by a few youths in Marseilles and of the clinical use of the wine of Hemp by Hahnemann, as shewn in a subsequent extract, I have been unable to trace any notice of the employment of this drug in Europe.

Much difference of opinion exists on the question, whether the Hemp so abundant in Europe, even in high northern latitudes, is identical in specific characters with the Hemp of Asia Minor and India. The extraordinary symptoms produced by the latter depend on resinous secretion with which it abounds, and which seems totally absent in the European kind. The closest physical resemblance or even identity exists between both plants—difference of climate seems to me more than sufficient to account for the absence of the resinous

\* Read before the Medical and Physical Society of Calcutta, on the 2d October 1839.

We have extracted from this paper the sections relative to the popular uses and effects on the animal system of these singular and valuable narcotics—for the professional details of cases, which we considered unsuited to our pages, we have to refer the reader to the *Transactions of the Medical and Physical Society*, current volume, fasciculus for November, 1839.—EDS.





Drawn by  
 L. George Muhlack

*Cannabis Indica.*

(Cannabis)

T. Black, et al. 1848

from Newburgh  
 (Original plates)



cretion, and consequent want of narcotic power in that indigenous in older countries.

In the subsequent article I first endeavour to present an adequate view of what has been recorded of the early history, the popular uses, and employment in medicine of this powerful and valuable substance; I then proceed to notice several experiments which I have instituted on animals, with the view to ascertain its effects on the healthy system; and, lastly, I submit an abstract of the clinical details of the treatment of several patients afflicted with hydrophobia, tetanus, and other convulsive disorders, in which a preparation of Hemp was employed with results, which seem to me to warrant our anticipating from its more extensive and impartial use no inconsiderable addition to the resources of the physician.

In the historical and statistical department of the subject, I owe my cordial thanks for most valuable assistance to the distinguished traveller the Syed Keramut Ali, Mootawulee of the Hooghly Imambarrah, and also to the Hakim Mirza Abdul Razes of Teheran, who have furnished me with interesting details regarding the consumption of Hemp in Candahar, Cabul, and the countries between the Indus and Herat. The Pandit Moodoosudun Gooptu has favoured me with notices of the statements regarding Hemp in the early Sanscrit authors on *Materia Medica*;—to the celebrated Kamalakantha Vidyalanka, the Pandit of the Asiatic Society, I have also to record my acknowledgments;—Mr. DaCosta has obligingly supplied me with copious notes from the *Mukzun-ul-Udwieh* and other Persian and Hindee systems of *Materia Medica*. For information relative to the varieties of the drug, and its consumption in Bengal, Mr. McCann, the Deputy Superintendent of Police, deserves my thanks;—and, lastly, to Dr. Goodeve, to Mr. Richard O'Shaughnessy, to the late Dr. Bain, to Mr. O'Brien of the Native Hospital, and Nobinchunder Mitter, Sub-Assistant Surgeon, I feel deeply indebted for the clinical details with which they have enriched the subject.

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## SECTION I.

*Botanical characters—Chemical Properties—Production.*

**BOTANICAL DESCRIPTION.**—Assuming with Lindley and other eminent writers that the *Cannabis sativa* and *Indica* are identical, we find that the plant is dioecious, annual, about three feet high, covered over with a fine pubescence; the stem is erect, branched, bright green, angular; leaves, alternate or opposite, on long weak petioles; digitate, scabrous, with linear, lanceolate, sharply serrated leaflets, tapering into a long smooth entire point; stipules subulate; clusters of flowers axillary with subulate bractes; males lax and drooping, branched and leafless at base; females erect, simple and leafy at the base. ♂ Calyx downy, five parted, imbricated. Stamens five; anthers large and pendulous. ♀ Calyx covered with brown glands. Ovary roundish with pendulous ovule, and two long filiform glandular stigmas; achenium ovate, one seeded.—*v. Lindley's Flora Medica*, p. 299.\*

The fibres of the stems are long and extremely tenacious, so as to afford the best tissue for cordage, thus constituting the material for one of the most important branches of European manufactures.

The seed is simply albuminous and oily, and is devoid of all narcotic properties.

**CHEMICAL PROPERTIES.**—In certain seasons and in warm countries a resinous juice exudes and concretes on the leaves, slender stems, and flowers;—the mode of removing this juice will be subsequently detailed. Separated and in masses it constitutes the *Churrus*† of Nipal and Hindostan, and to this the type, or basis of all the Hemp preparations, are the powers of these drugs attributable.

The resin of the Hemp is very soluble in alcohol and ether, partially soluble in alkaline; insoluble in acid solutions; when pure, of a blackish grey colour; hard at 90°; softens at higher temperatures, and fuses readily;—soluble in the fixed and in several volatile oils. Its

\* The drawing which illustrates this paper has been copied by my accomplished friend Dr. George Wallich, from Roxburgh's unpublished plate.

† For very fine specimens of *Churrus*, I have to express my thanks to Dr. Campbell, late assistant Resident at Nipal.

our is fragrant and narcotic ; taste slightly warm, bitterish, and acid.

The dried Hemp plant which has flowered and *from which the resin is not been removed* is called *Gunjah*. It sells for twelve annas to one pice the seer, in the Calcutta bazars, and yields to alcohol twenty per cent of resinous extract, composed of the resin (*churrus*), and green colouring matter (*chlorophylle*). Distilled with a large quantity of water, traces of essential oil pass over, and the distilled liquor has the powerful narcotic odour of the plant. The *Gunjah* is sold for smoking chiefly. The bundles of *Gunjah* are about two feet long and three inches in diameter, and contain twenty-four plants. The colour is dusky green—the odour agreeably narcotic—the whole plant resinous and adhesive to the touch.

The larger leaves and capsules without the stalks, are called *Bang*, *Subjee* or *Sidhee*." They are used for making an intoxicating drink, for smoking, and in the conserve or confection termed *ajoon*. *Bang* is cheaper than *Gunjah*, and though less powerful, is sold at such a low price that for one pice enough can be purchased to intoxicate an "experienced" person.

According to Mr. McCann's notes, the *Gunjah* consumed in Bengal is chiefly brought from Mirzapúr and Ghazeepore, being extensively cultivated near Gwalior and in Tirhoot. The natives cut the plant when in flower, allow it to dry for three days, and then lay it in bundles averaging one seer weight each, which are distributed to the licensed dealers. The best kinds are brought from Gwalior and Bhurtpore, and it is also cultivated, of good quality, in a few gardens round Calcutta. In Jessore, I am informed, the drug is produced of excellent quality, and to a very considerable extent of cultivation.

In Central India and the Saugor territory and in Nipal, *Churrus* is collected during the hot season in the following singular manner. Men clad in leathern dresses run through the Hemp-fields brushing through the plant with all possible violence ; the soft resin adheres to the leather, and is subsequently scraped off and kneaded into balls, which sell from five to six rupees the seer. A still finer kind, the *Momeea* or waxen *Churrus*, is collected by the hand in Nipal, and sells for nearly double the price of the ordinary kind. In Nipal, Dr. McKinnon informs me, the leathern attire is dispensed with, and the resin is gathered on

the skins of naked coolies. In Persia, it is stated by Mirza Ab Razes that the *Churrus* is prepared by pressing the resinous plant coarse cloths, and then scraping it from these and melting it in a with a little warm water. He considers the *Churrus* of Herat as best and most powerful of all the varieties of the drug.

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## SECTION II.

### *Popular uses.*

The preparations of Hemp are used for the purpose of intoxication follows.

*Sidhee*, *Subjee*, and *Bang* (synonymous) are used with water as drink, which is thus prepared. About three tola weight, 540 grains, are well washed with cold water, then rubbed to powder, mixed with black pepper, cucumber and melon seeds, sugar, half a pint milk, and an equal quantity of water. This is considered sufficient to intoxicate an habituated person. Half the quantity is enough for a novice. This composition is chiefly used by the Mahomedans of the better classes.

Another recipe is as follows.

The same quantity of *Sidhee* is washed and ground, mixed with black pepper, and a quart of cold water added. This is drunk at once sitting. This is the favorite beverage of the Hindus who practice the vice, especially the Birjobassies and many of the Rajpootana soldiery.

From either of these beverages intoxication will ensue in half an hour. Almost invariably the inebriation is of the most cheerful kind, causing the person to sing and dance, to eat food with great relish, and to seek aphrodisiac enjoyments. In persons of a quarrelsome disposition on such occasions, as might be expected, an exasperation of their natural tendency. The intoxication lasts about three hours, when sleep supervenes. No nausea or sickness of stomach succeeds, nor are the bowels at all affected; next day there is slight giddiness and vascularity of the eyes, but no other symptom worth recording.

*Gunjah* is used for smoking alone—one rupee weight, 180 grains, and a little dried tobacco are rubbed together in the palm of the hand with a few drops of water. This suffices for three persons. A little



tobacco is placed in the pipe first, then a layer of the prepared *Gunjah*, then more tobacco, and the fire above all.

Four or five persons usually join in this debauch. The hookah is passed round, and each person takes a single draught. Intoxication ensues almost instantly; and from one draught to the unaccustomed, within half an hour; and after four or five inspirations to those more practised in the vice. The effects differ from those occasioned by the *Sidhee*. Heaviness, laziness, and agreeable reveries ensue, but the person can be readily roused, and is able to discharge routine occupations, such as pulling the punkah, waiting at table, &c.

The *Majoon*, or Hemp confection, is a compound of sugar, butter, flour, milk, and *Sidhee* or *Bang*. The process has been repeatedly performed before me by Ameer, the proprietor of a celebrated place of resort for Hemp devotees in Calcutta, and who is considered the best artist in his profession. Four ounces of *Sidhee* and an equal quantity of *Ghee* are placed in an earthen or well-tinned vessel, a pint of water added, and the whole warmed over a charcoal fire. The mixture is constantly stirred until the water all boils away, which is known by the crackling noise of the melted butter on the sides of the vessel; the mixture is then removed from the fire, squeezed through cloth while hot—by which an oleaginous solution of the active principles and colouring matter of the Hemp is obtained—and the leaves, fibres, &c., remaining on the cloth are thrown away.

The green oily solution soon concretes into a buttery mass, and is then well washed by the hand with soft water so long as the water becomes coloured. The colouring matter and an extractive substance are thus removed, and a very pale green mass, of the consistence of simple ointment, remains. The washings are thrown away;—Ameer says that these are intoxicating, and produce constriction of the throat, great pain, and very disagreeable and dangerous symptoms.

The operator then takes two pounds of sugar, and adding a little water places it in a pipkin over the fire. When the sugar dissolves and froths, two ounces of milk are added; a thick scum rises and is removed—more milk and a little water are added from time to time, and the boiling continued about an hour, the solution being carefully stirred until it becomes an adhesive clear syrup, ready to solidify on a cold surface; four ounces of tyre (new milk dried before the sun) in fine powder are

now stirred in, and lastly the prepared butter of Hemp is introduced, brisk stirring being continued for a few minutes. A few drops of attur of roses are then quickly sprinkled in, and the mixture poured from the pipkin on a flat cold dish or slab. The mass concretes immediately into a thin cake, which is divided into small lozenge-shaped pieces. A seer thus prepared sells for four rupees: one drachm by weight will intoxicate a beginner; three drachms one experienced in its use. The taste is sweet, and the odour very agreeable.

Ameer states that there are seven or eight *Majoon* makers in Calcutta;—that sometimes by special order of customers he introduces stramonium seeds, but never nux-vomica;—that all classes of persons including the lower Portuguese or “Kala Feringhees,” and especially their females, consume the drug;—that it is most fascinating in its effects, producing extatic happiness, a persuasion of high rank, sensation of flying, voracious appetite, and intense aphrodisiac desire. He denies that its continued use leads to madness, impotence, or to the numerous evil consequences described by the Arabic and Persian physicians. Although I disbelieve Ameer’s statements on this point, his description of the immediate effects of *Majoon* is strictly and accurately correct.

Most carnivorous animals eat it greedily, and very soon experience its narcotic effects, becoming ludicrously drunk, but seldom suffering any worse consequences.

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### SECTION III.

*Historical details—Notices of Hemp, and its popular uses, by the Sanscrit, Arabic, and Persian writers.*

The preceding notice suffices to explain the subsequent historical and medicinal details. I premise the historical, in order to shew the exact state of our knowledge of the subject, when I attempted this investigation.

Although the most eminent of the Arabic and Persian authors concur in referring the origin of the practice of Hemp intoxication to the natives of Hindoostan, it is remarkable that few traces can be detected of the prevalence of the vice at any early period in India.

The Pandit Moodoosudun Gooptu finds that the "*Rajniguntu*," a standard treatise on *Materia Medica*, which he estimates vaguely at 600 years date, gives a clear account of this agent. Its synonymes are "*Bijoya*," "*Ujoya*," and "*Joya*,"—names which mean, promoters of success; "*Brijputta*," or the strengthener, or the strong-leaved; "*Chapola*," the causer of a reeling gait; "*Ununda*," or the laughter-moving; "*Hursini*," the exciter of sexual desire. Its effects on man are described as excitant, heating, astringent. It is added that it "destroys phlegm, expels flatulence, induces costiveness, sharpens the memory, increases eloquence, excites the appetite, and acts as a general tonic."

The "*Rajbulubha*," a Sanscrit treatise of rather later date, alludes to the use of Hemp in gonorrhœa, and repeats the statements of the "*Rajniguntu*." In the Hindu Tantra, or a religious treatise, teaching peculiar and mystical formulæ and rites for the worship of the deities, it is said, moreover, that *Sidhee* is more intoxicating than wine.

In the celebrated "*Susruta*," which is perhaps the most ancient of all Hindu medical works, it is written, that persons labouring under catarrh should, with other remedies, use internally the *Bijoya* or *Sidhee*. The effects however are not described.

The learned Kamalakantha Vidyalanka has traced a notice of Hemp in the 5th chapter of *Menu*, where Brahmins are prohibited to use the following substances, *Palandoo* or onions, *Gunjara* or *Gunjah*, and such condiments as have strong and pungent scents.

The Arabic and Persian writers are however far more voluminous and precise in their accounts of these fascinating preparations. In the 1st vol. of De Sacy's "*Crestomathie Arabe*" we find an extremely interesting summary of the writings of Takim Eddin Makrizi on this subject. Lane has noticed it too with his usual ability in his admirable work "*the Modern Egyptians*." From these two sources, the MS. notes of the Syed Keramut Ali and Mr. DaCosta, and a curious paper communicated by our friend Mirza Abdul Razas, a most intelligent Persian physician, the following epitome is compiled.

Makrizi treats of the Hemp in his glowing description of the celebrated Canton de la Timbaliere, or ancient pleasure grounds, in the vicinity of Cairo. This quarter, after many vicissitudes, is now a heap of ruins. In it was situated a cultivated valley named Djoneina, which we are informed was the theatre of all conceivable abomina-

tions. It was famous above all for the sale of the *Hasheeha*, which is still greedily consumed by the dregs of the populace, and from the consumption of which sprung the excesses which led to the name "Assassin" being given to the Saracens in the Holy Wars. The history of the drug the author treats of thus:—The oldest work in which Hemp is noticed is a treatise by Hasan, who states that in the year 658, M. E. the Sheikh Djafar Shirazi, a monk of the order of Haider, learned from his master the history of the discovery of Hemp. Haider, the chief of ascetics and self-chasteners, lived in rigid privation on a mountain between Nishabor and Ramah, where he established a monastery of Fakirs. Ten years he had spent in this retreat without leaving for a moment, till one burning summer's day when he departed alone to the fields. On his return an air of joy and gaiety was imprinted on his countenance; he received the visits of his brethren and encouraged their conversation. On being questioned, he stated that struck by the aspect of a plant which danced in the heat as if with joy, while all the rest of the vegetable creation was torpid, he had gathered and eaten its leaves. He led his companions to the spot,—all ate and all were similarly excited. A tincture of the Hemp leaf in wine or spirit seems to have been the favorite formula in which the Sheikh Haider indulged himself. An Arab poet sings of Haider's *emerald cup*—an evident allusion to the rich green colour of the tincture of the drug. The Sheikh survived the discovery ten years, and subsisted chiefly on this herb, and on his death his disciples by his desire planted it in an arbour about his tomb.

From this saintly sepulchre the knowledge of the effects of Hemp is stated to have spread into Khorasan. In Chaldea it was unknown until 728 M. E. during the reign of the Khalif Mostansir Billah: the kings of Ormus and Bahrein then introduced it into Chaldea, Syria, Egypt, and Turkey.

In Khorasan however, it seems that the date of the use of Hemp is considered to be far prior to Haider's era. Biraslan, an Indian pilgrim, the contemporary of Cosröes,\* is believed to have introduced it at

\* By this term is probably meant the first of the Sassanian dynasty, to whom the epithet "of Khusröw" or Cosröes, equivalent to Káiser, Cæsar, or Czar, has been applied in many generations. This dynasty endured from A. D. 202 to A. D. 636. *Vide* note 50 to Lane's translation of the *Arabian Nights*, vol. II. p. 226.



diffused the custom through Khorasan and Yemen. In proof of the great antiquity of the practice, certain passages in the works of Hippocrates may be cited, in which some of its properties are clearly described—but the difficulty of deciding whether the passages be spurious or genuine, renders the fact of little value. Dioscorides (lib. ij. cap. 169,) describes Hemp, but merely notices the emollient properties of its seeds—its intoxicating effects must consequently be regarded as unknown to the Greeks prior to his era, which is generally agreed to be about the second century of the Christian epoch, and somewhat subsequent to the lifetime of Pliny.

In the narrative of Makrizi we also learn that oxymel and acids are the most powerful antidotes to the effects of this narcotic; next to these, emetics, cold bathing, and sleep; and we are further told that it possesses diuretic, astringent, and especially aphrodisiac properties. Ibn Beitar was the first to record its tendency to produce mental derangement, and he even states that it occasionally proves fatal.

In 780 M. E. very severe ordinances were passed in Egypt against the practice: the Djoneina garden was rooted up, and all those convicted of the use of the drug were subjected to the extraction of their teeth; but in 799 the custom re-established itself with more than original vigour. Makrizi draws an expressive picture of the evils this vice then inflicted on its votaries—"As its consequence, general corruption of sentiments and manners ensued, modesty disappeared, every base and evil passion was openly indulged in, and nobility of external form alone remained to these infatuated beings."

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#### SECTION IV.

*Medicinal properties assigned to Hemp by the ancient Arabian and Persian writers, and by modern European authors.*

In the preceding notice of Makrizi's writings on this subject we have confined ourselves chiefly to historical details, excluding descriptions of supposed medicinal effects. The Mukzun-ul-Udwieh and the Persian MS. in our possession, inform us as to the properties which the ancient physicians attributed to this powerful narcotic.

In Mr. DaCosta's MS. version of the chapter on Hemp in the Mukzu-ul-Udwieh, *Churrus*, we are informed, if smoked through a pipe causes torpor and intoxication, and often proves fatal to the smoker. The kinds are noticed, the *garden*, *wild*, and *mountain*, of which the last is deemed the strongest;—the seeds are called *sheadana* or *shaldan* in Persia. These are said to be “a compound of opposite qualities cold and dry in the third degree, that is to say, stimulant and sedative imparting at first a gentle reviving heat, and then a considerable refrigerant effect.”

The contrary qualities of the plant, its stimulant and sedative effects are prominently dwelt on. “They at first exhilarate the spirits, cause cheerfulness, give colour to the complexion, bring on intoxication, excite the imagination into the most rapturous ideas, produce thirst, increase appetite, excite concupiscence. Afterwards the sedative effects begin to preside, the spirits sink, the vision darkens and weakens, and madness, melancholy, fearfulness, dropsy, and such like distempers are the sequel—and the seminal secretions dry up. These effects are increased by sweets, and combated by acids.”

The author of the Mukzun-ul-Udwieh further informs us—

“The leaves make a good snuff for detarging the brain; the juice of the leaves applied to the head as a wash, removes dandruff and vermin; drops of the juice thrown into the ear allay pain and destroy worms or insects. It checks diarrhoea, is useful in gonorrhoea, restrains seminal secretions, and is diuretic. The bark has a similar effect.”

“The powder is recommended as an external application to fresh wounds and sores, and for causing granulations; a poultice of the boiled root and leaves for discussing inflammations, and cure of erysipelas, and for allaying neuralgic pains. The dried leaves bruised and spread on a castor oil leaf cure hydrocele and swelled testes. The dose internally is one *diram*, or 48 grains. The antidotes are emetics, and milk, hot water, and sorrel wine.”

Alluding to its popular uses, the author dwells on the eventual consequences of the indulgence;—weakness of the digestive organs ensues, followed by flatulency, indigestion, swelling of the limbs and face, change of complexion, diminution of sexual vigor, loss of temper, heaviness, cowardice, depraved and wicked ideas, scepticism in re-



us tenets ;—licentiousness and ungodliness are also enumerated in the catalogue of deplorable results.

The medicinal properties of Hemp, in various forms, are the subject of some interesting notes by Mirza Abdul Razes. “ It produces ravenous appetite and constipation, arrests the secretions except that of the liver, excites wild imagining, especially a sensation of ascending, forgetfulness of all that happens during its use, and such mental exaltation, that *the beholders attribute it to supernatural inspiration.*”

Mirza Abdul considers Hemp to be a powerful exciter of the flow of bile, and relates cases of its efficacy in restoring appetite—of its utility as an external application as a poultice with milk, in relieving hæmorrhoids—and internally in gonorrhœa to the extent of a quarter drachm of *bangh*. He states also that the habitual smokers of *Gunjah* generally die of diseases of the lungs, dropsy, and anasarca—“ so do the eaters of *Majoon* and smokers of *Sidhee*, but at a later period. The inexperienced on first taking it are often senseless for a day, some go mad, others are known to die.”

In the 35th chapter of the 5th volume of Rumphius’ *Herbarium Amboinense*, p. 208, Ed. Amsterd. A. D. 1695, we find a long and very good account of this drug, illustrated by two excellent plates. The subjoined is an epitome of Rumphius’ article.

Rumphius first describes botanically the male and female Hemp plants, of which he gives two admirable drawings. He assigns the upper provinces of India as its *habitat*, and states it to be cultivated in Java and Amboyna. He then notices very briefly the exciting effects ascribed to the leaf, and to mixtures thereof with spices, camphor, and opium. He alludes doubtfully to its alleged aphrodisiac powers, and states that the kind of mental excitement it produces depends on the temperament of the consumer. He quotes a passage from Galen, lib. i. (de aliment, facult) in which it is asserted that in that great writer’s time it was customary to give Hemp seed to the guests at banquets and promoters of hilarity and enjoyment. Rumphius adds, that the Mahomedans in his neighbourhood frequently sought for the male plant from his garden to be given to persons afflicted with virulent gonorrhœa and with asthma, or the affection which is popularly called stitches in the side.” He tells us, moreover, that the powdered

leaves check diarrhœa, are stomachic, cure the malady named *pū* and moderate excessive secretion of bile. He mentions the use of Hemp smoke as an enema in strangulated hernia, and of the leaves as an antidote to poisoning by orpiment. Lastly, he notices in the subsequent chapters varieties of Hemp which he terms the *Gunjah sativa* and *Gunjah agrestis*. In the *Hortus Malabaricus* Rheer's article on the Hemp is a mere outline of Rumphius' statements.

Among modern European writers the only information I can trace on the medicinal use of Hemp in Europe, is in the recent work of Ness v. Esenbeck, from which the following is an extract kindly supplied by Dr. Wallich:—

“The fresh herb of the Hemp has a very powerful and unpleasant narcotic smell, and is used in the East in combination with opium, in the preparation of intoxicating potions, &c. It is probable that the *nepenthe* of the ancients was prepared from the leaves of this plant. Many physicians, Hahnemann among them, prescribe the vinous extract in various nervous disorders, where opium and hyoscyamus used to be employed, being less heating and devoid of bitterness.”\*

No information as to the medicinal effects of Hemp exists in the standard works on Materia Medica, to which I have access. Soubeiran, Feé, Merat, and de Lens in their admirable dictionary; Chevalier and Richard, Roques (*Phytographie Medicale*); Ratier and Henry (*Pharmacopée Française*); and the *Dictionnaire des Sciences Medicales*—are all equally silent on the subject.

In *Ainslie's Materia Indica*, 2nd vol. we find three notices of the plant and its preparations.

At page 39 “Banghie,” (*Tamul*) with the Persian and Hindee synonymes of “Beng” and “Subjee,” is described as an intoxicating liquor prepared with the leaves of the *Gunjah*, or Hemp plant.

Under the head *Gunjah*, Ainslie gives numerous synonymes, and tells that the leaves are sometimes prescribed in cases of diarrhœa; and in conjunction with turmeric, onions, and warm gingilie oil are made into an unction for painful protruded piles. Dr. Ainslie also gives a brief view of the popular uses and botanical peculiarities of the plant.

\* *Handbuch der Medicin : und Pharmac : Botanik*, von F. Ness von Esenbeck Dr. Carl Ebermaier, vol. 1, p. 338.

*Majoon*, lastly, is described by Dr. Ainslie, page 176, as a preparation of sugar, milk, ghee, poppy seeds, flowers of the datura, powder of nux-vomica, and sugar. The true *Majoon* however as prepared in Bengal contains neither datura nor nux-vomica. I have already described the process by which it has been manufactured before me.

In the *Journal de Pharmacie*, the most complete Magazine in existence on all pharmaceutical subjects, we find Hemp noticed in several volumes. In the *Bulletin de Pharmacie* t. v. A. 1810, p. 400, we find it briefly described by M. Rouyer, apothecary to Napoleon, and member of the Egyptian scientific commission, in a paper on the popular remedies of Egypt. With the leaves and tops, he tells us, collected before ripening, the Egyptians prepare a conserve, which serves as the base of the *berch*, the *diasmouk*, and the *bernaouy*. Hemp leaves reduced to powder and incorporated with honey or stirred with water constitute the *berch* of the poor classes.

The same work also, (*Bulletin*, vol. i. p. 523, A. 1809,) contains a very brief notice on the intoxicating preparations of Hemp, read by M. De Sacy before the Institute of France in July, 1809. M. De Sacy's subsequent analysis of Makrizi, of which I have given an outline, is however much more rich in details than the article in the *Bulletin*.

(*To be continued.*)

ART. VII.—*Memoir on the Climate, Soil, Produce and Husbandry of Afghanistan and the Neighbouring Countries.*—By Lieut. IRWIN.

It gives us great pleasure to be the means of rescuing from undeserved oblivion, the admirable Memoir on Afghanistan, of which we now present to our readers the first part. The author (then) Lieut. IRWIN accompanied Mr. ELPHINSTONE in his Mission to Cabul, and is honorably mentioned in the preface to Mr. E's justly celebrated work. The Memoir we now publish exists in the Library of the Asiatic Society, and was first brought to our notice by Captain CUNNINGHAM of the Bengal Engineers. Subsequently Dr. SPRY struck by the value of its details on rural economy, proposed its publication to the Agri-

cultural Society. We were unwilling to concede even to that most useful public body, the honor of discharging a duty we felt to be peculiarly our own; our readers will doubtless be gratified at our thus enriching our pages.

In the next number we hope to communicate some information regarding the accomplished author; who, we understand is now a resident in Van Dieman's Land.—EDS.

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*Plan and Division of the Memoir.*

The first 47 paragraphs compose an Introduction which treats of the natural division of the countries under view, their chief ranges of mountains and rivers. I here assign the extent in which I understand the various names for countries, provinces, and districts. Without this precaution the matter which follows would have been obscure or prolix, perhaps both. This is divided into four parts. The first part treats of Climate, and is divided into four sections, in which are discussed in their order, the temperature, the winds, the rains and the salubrity. The second part treats of the Soil, and has no division. The third part treats of Natural History, and is divided into three sections;—in the first, are mentioned the mines and mineral products of these kingdoms; in the second, the most remarkable vegetables; in the third, the animals and carriage. In this part of the memoir some matter has found a place which will scarcely be reckoned interesting in a public view, but which was naturally introduced from the desire of completing the plan originally proposed. The fourth part is an attempt to give some idea of the husbandry. The second, which I entitle “a review of the districts,” details what are the chief occupations and means of subsistence, the chief live stock and kinds of grain, the plenty or scarcity of supplies, and some particulars of a miscellaneous nature; it concludes with an estimate of the population.

The following is a briefer sketch of the contents of this memoir:

Introduction,

I. Climate.—1 Temperature,—2 Winds,—3 Rains,—4 Salubrity.

II. Soil.

III. Natural History.—1 Minerals,—2 Vegetables,—3 Animals.

IV. Husbandry and Cultivation.—1 Husbandry,—2 Review of the Districts.

*Of the Climate, Soil, Products, and Husbandry of Afghanistan and the Neighbouring Countries.*

In the following pages I treat of a wide extent of country, being nearly the whole of the space of which a map has lately been constructed by Lieut. Macartney. In a more particular manner will be treated Afghanistan, which is central in it. Such is the extent and diversity of this last country alone, that were our attention confined to it, still could a brief treatise contain but cursory notices even of the important parts of a subject so extensive; much more must it be so, when the neighbouring tracts are to be in some measure included in the survey. With respect to the accuracy also of the matter here offered, although it be hoped that there is a considerable preponderance of truth, it must be supposed that in the circumstances under which it has been collected and digested, the errors too must be numerous.

2. Afghanistan is bounded on the north by mountains which divide it from Kashkar and Budukhshan; other mountains divide it on the north-west from that part of Toorkistan which lies on this side of the Oxus, and that part of Khoorasan which extends north nearly to that river; on the west it includes a part of that famous geographical division; while beyond in this direction is the Persian Khoorasan; to the south it has deserts and Bulochistan. The Indus from its exit from the lofty mountains in about the latitude of  $45^{\circ}$  N. sometimes constitutes its eastern boundary, and sometimes is comprehended in it, as will be in the sequel more fully explained. Discarding the provinces of Sindh and Kushmeer, as if parts of India, and also the provinces lately belonging to the monarchy in the south-east of Toorkistan, with the contiguous ones in the north-east of Khoorasan, the Afghan people and government may be considered as included within the 35th and 29th degrees of north latitude and the 62nd and 73rd of east longitude.

3. Without discussing the nature of the political connection between Bulochistan and the Afghan monarchy, it seems sufficient for us that there is a practical convenience in naming and considering them separately. Bulochistan, so called from two nations called Bulochis, who compose the bulk of its population, has Afghanistan to the north, a desert dividing it in that quarter from Seestan, (Seestan on the whole lies north-west of Bulochistan); to the west, deserts or very ill-peopled tracts divide it from the Persian province Kirman; to the south is the sea; and to the east Sindh. The government of Sindh



possesses the port of Kirachee, which may be considered as locally within Bulochistan. The country is thus included within the 25th and 31st degrees of north latitude, and the 60th and 70th of east longitude.

4. We have already seen that Afghanistan embraces a part of Khoorasan, an ancient geographical division which has been recognized downwards from the earliest times, not merely in books but in common conversation, and that with little variation, notwithstanding the frequent changes of dominion and even of population in the country. We are not concerned with its southern or western boundaries. To the east it extends in one point to Mookr, and in that neighbourhood may be considered as ending where considerable heights begin; it thus includes the whole of the Dooranee country. Seestan too is but a division of it. In more northern latitudes its extent is more difficult to fix. The western part of the Paraparnisan range of hills with the valleys contained and the neighbouring plains—forming together the country of the Ymaks—both was and is considered as part of Khoorasan; but the eastern part of the same tract which the Huzaras possess may more properly be stiled a broad boundary between it and Hindoostan, in its largest sense, which includes Cabul and even Ghuznee. Still more to the north Khoorasan in ancient times extended to the confines of Budukhshan, thus including My-muna, Undkho, Bulkh, Koonduz, Khoollum, Ghoree, and Talikan. Perhaps Budukhshan itself, and whatever lies on the left of the Punj or Upper Oxus, was formerly part of Khoorasan, while the country on the right was coarsely distinguished as that lying beyond the river (Mawaroolnahr.) But the usage of modern times is contrary to such an extension of the term, and restricts Khoorasan in this quarter nearly by the river Marghab. In Asia rivers seldom form boundaries, but rather are themselves considered as included in certain countries on both their banks, and thus Khoorasan may be allowed to comprehend a certain distance to its right, especially during its upper course. From where that stream empties itself into the Oxus, the Oxus is perhaps for a certain distance the boundary of Toorkistan to the north and Khoorasan to the south. In truth both banks of that great river, but especially the left, are here so barren, that limits are little regarded or understood. Towards the mouth of the river, Toorkistan extends considerably to the left of it, unless we consider Khwaruzm as distinct from either division.

5. The term Toorkistan in its present sense is but modern, and liable to some ambiguity. It may be said to contain the following provinces—



1st, The ancient Khwaruzm, lying towards the mouth of the Oxus chiefly, if not entirely to its left, and the Toorkman deserts extending from it towards the Caspian. 2nd, The tract we have just excluded from the modern Khoorasan, but not including Budukhshan. The natives having no appropriate name for it, I propose to distinguish it by the ancient one of Bactria. 3rd, The tract lying between the Oxus and Jaxartes, with a small territory beyond the latter river. 4th, The country beyond the Jaxartes inhabited by the Kuzzkas to the west and Kirghizes to the east;—tribes but little advanced in society, or acquainted with agriculture. Beyond them to the north we come to the Russian dominions, and on the east the Chinese. A fifth tract to be called Chinese Toorkistan, and not to be included under the term of Toorkistan simply, is to be afterwards mentioned. These general terms will in the sequel be less used than others more particularly applicable to countries of far inferior extent; but preparatory to the enumeration of these, let us sketch the course of the mountains and hills, which chiefly mark out their boundaries and give them their character.

6. The first and greatest ridge is that which forms the boundary to the north of Afghanistan. It originates however near the right of the Gurmhpootr river, and running thence in a westerly and northerly direction, forms a boundary of the plains of Hindoostan and the Punjab, which are watered by the streams that either originate in it or the lofty lands beyond it. Within it is contained the fertile valley of Kushmeer, and beyond Kushmeer it forms the lofty tract called Little Tibet, and bounds to the north Pukhlee, into which it seems to send a branch. Crossing the Indus it has no longer the same tendency to the north of west, but running in nearly  $35^{\circ} 25'$  north latitude separates Shooner, Swad, and Punjkora, small districts now occupied by the Toosufzyes, and into which its branches extend from Kashkar to the north. Arrived at the river commonly called from this last country, its originating in it, its greatest ridge appears to stretch in a direction to the south of west to a termination in the mountain Hindookoosh, but one minor ridge is detached along the left of the Kashkar river, which it divides from Bajaur to the Punjkora, while others on the right of that river form in their course the cragged country of the Kafeis, but the Kafeis have some other portions of those mountains, and overhang the low valley of Lughuran. This grand chain has as a whole no acknowledged name among the natives, nor have the European authors yet agreed in one denomination to be given it. It is undoubtedly very lofty, not merely in its central ridge but in most of its lateral branches;

towards Afghanistan this height is usually gained very rapidly, so that not unfrequently low and hot valleys and plains lie at the foot of mountains white with perennial snow.

7. In the opposite quarter they do not preserve one character. Hindookoosh has a rapid descent into Budukhshan, which it divides from the valley of Cabul; more to the east there issues from the great northern ridge another, by geographers named Belur, a term corrupted from the Toorkee word Beloot, signifying a cloud, and which runs perhaps due north and divides Budukhshan, Durwaz, and Kuralegin on the west, from Kashkar on the east. Into all those countries, and beyond them into Toorkistan between the Oxus and Jaxartes, it sends branches generally of considerable height; but according to Lieut. Macartney it cannot be considered as extending beyond the river Jaxartes, which rises in its northern extremity not far from the farthest sources of the Oxus. The Kashkar river too seems to originate in the same neighbourhood but to the east of this range, along the foot of which it generally runs, and by which it is prevented running westwards towards the Caspian. To the left chiefly, or to the east of this river, is the country of Kashkar, which has on the south the great northern chain, so called as lying to the north of Afghanistan. This chain has here a moderate descent, and Kashkar appears to be generally speaking an high plain, which is as it were, supported by it. Many points however remain very obscure. Lieut. Macartney is of opinion that this high plain of Kashkar is surmounted to the north or north-east by another chain of mountains nearly parallel to the first, and in which originate, or partly originate, the Indus and the Kashkar river; and that these mountains in their north-western extremity join the northern extremity of the Belur chain. With respect to this other range which meets the Belur, it seems rather a slight height of land than a lofty ridge, and there is no absurdity in supposing it lower than the ridge first mentioned, though the streams generated in it pierce that ridge. In short, it seems probable that the table land is continued from Tibet as well as the mountains, and this table land naturally has a ridge from which the waters are turned contrary ways, but which need not be supposed lofty above its base. Certain it is that after entering Kashkar travellers from Peshawur to Yarkund, whose course is not very different from due north, have no very high mountains to pass. It is true Kashkar is not destitute of other mountains besides those bounding it to the south and west, but they do not appear to give a character to the country. The north-west part of this table land which lies north of

ashkar is remarkable for its uniformity and levelness. It is named Pamer, which in the Toorkee of Yarkund signifies "the plain." It appears to be drained west, and probably into the Jaxartes chiefly. The road to Yarkund extends across it for about 60 miles or less, but in length it is said to be double. It is bounded to the south-west by the mountains above Keerategin, and to the north-west by those near the heads of the Jaxartes. Both are of the Belur chain, which is in fact to be considered as the steep termination of that broad upland tract which extends from the longitude of  $69^{\circ}$  to that of  $93^{\circ}$  east.

8. In this view of the subject Hindookoosh would be considered as a branch sent from this broad tract still further west. This lofty mountain has also its inferior branches spreading in many directions. A very considerable branch appears to extend from the Belur where at its greatest height it gives source to the Oxus and Jaxartes, and proceeding first west and afterwards south-west, separates Keerategin, Yukheeka, and Durwuz, which are drained into the upper Oxus, from Kohun and other places drained into the Jaxartes, as also from some part of the middle of Toorkistan, the waters of which hold their course to the Oxus in its inferior progress. I presume that all the hills of Toorkistan between those great rivers are to be traced to the Belur. That inferior range only called Aktaw, and which lies between Samarkand and the Jaxartes, seems distinct and insulated. With respect to the hills in the Kuzzak and Kirghiz countries beyond the Jaxartes, I know not what is their exact situation or direction. The former people indeed inhabit a tract generally level on the right of the lower Jaxartes. The Kirghizes pasture the Pamer, but have lower and more hilly grounds to the north-west. Geographers mention under the name of Alak, a range which joins to the Belur and continues in the same direction, that is towards the north, dividing the great and little Bucharias of some authors, here called independent and Chinese Toorkistan. Between Hokun, a city to the left of the Jaxartes in its upper course, and Yarkund in Chinese Toorkistan, one route at least leads over a high mountain, and in the latter country all the waters run to easterly instead of westerly points. The Alak range contains some of the sources of the Jaxartes, and in a higher latitude is said to originate the Neelum which, like the Jaxartes, runs to a westerly point. On the other side arises the Kizlsoo, or river of Kashghur and Yarkund, which, however, seems to be fed also from the grand tract of uplands already mentioned to the south, and from a chain of mountains far to the north, which geographers lay down from east to west and call the Altaian chain. Their latitude may be supposed to be  $46^{\circ}$ ,

and that of Yarkund being by Lieutenant Macartney's construction  $40^{\circ} 30'$ , the medium breadth of Chinese Toorkistan will be at least 400 English miles. Beyond the Altaian chain the waters run north into Siberia and the Frozen ocean. All those of Chinese Toorkistan are lost in itself or in the country immediately to the east (which is also subject to China); to this quarter alone does it slope, while in all others it is bounded by land much higher. Thus false is the common opinion of its forming part of what has been called the table land of Asia; the climate alone is sufficient to convince us of the contrary. Though in a higher latitude than any part of Tibet, the climate is much warmer, a fact we need not be surprized at, since we are informed by merchants who have travelled through great Tibet from Kust Meer to Yarkund that at a certain distance beyond Ludakh begins descent to Yarkund.

9. There prevails in Europe, or did prevail, an opinion that the Caucasian mountains extend uninterruptedly on the south of Geelan and Mazunduran, and through Khoorasan to a junction with the Hindookoosh. It is highly probable the continuity is not broken until we reach a certain distance into the last country, but afterwards we find for a considerable distance only detached hills, seldom of very considerable altitude; or if there be any chain, or chain of hillocks dividing the rain water and the spring torrents, giving source to no rivers. To treat such as a continuation of Caucasus and Hindookoosh is a manifest abuse of terms. It is moreover aiming at a simplicity of arrangement which is excessive, and tends to darken the subject, not to elucidate it; for by such modes of reasoning ranges might be easily traced from any point, and all the hills and mountains of a continent proved to form parts of one range or of its branches. When generalizations so forced are made, nothing can be affirmed or denied of the whole which shall not be untrue of a considerable number of the facts; and recourse must at length be had to sub-divisions of moderate comprehension, which alone conduce to brevity, perspicuity and the easy development of facts.

10. There even occur cases where though a connection must be allowed to exist, such is the dissimilarity of character in mountains that they cannot conveniently be made to pass under one name, or be treated of except separately; such is that of a chain which though it have no connection with Caucasus, has an undoubted one with Hindookoosh. We have seen that this famous mountain lies nearly due north of Cabul; but in a west or north-west direction from the valley, the roads to Toorkistan lead over a mountain which the native



requently call by the same name, and which is undoubtedly connected with it. The course of the mountains thus appears to change from west to south-west, and thence to almost due south, giving rise in that quarter to the Helbund, the greatest river of Khoorasan. The future course of the central and chief ridge it is difficult to ascertain with much minuteness, but its general course seems to be almost due west to the longitude of Hirat. The branches are numerous and extend to considerable distances, being visible from Candahar, and approaching still nearer to Mimuna, Undkho, and Bulkh in the northern directions. These are the mountains which the ancients seem generally to have distinguished by the name Paraparnisan. I say generally, because doubtless quotations might be brought forward in which the term is applied to others. Disregarding such instances, I propose to restrict the term to this range. The Paraparnisan is not so lofty as the great northern chain. Except the mountain called Chadeean, from a village of that name at its foot in the environs of Bulkh, I know no well-ascertained instance of continued snow on any one of them, though it is possible several such exist. They also rise more gradually from their bases than the other chain. Their abruptest descent seems towards Bactria. At their commencement, where they form the tract inhabited by the Gavee Huzaras, they have on the east a gradual descent to the high valley of Cabul, but towards Bactria so rapid, that we soon arrive at climates considerably warmer than Cabul. The table land of Ghuznee, still more elevated than Cabul, bounds to the east the main body of the Paraparnisan which gradually rise from it; to the south-west and north-west the descent into Khoorasan is also in general gradual.

11. Within Afghanistan we have first to notice that range which runs for the most part in latitude  $34^{\circ}$ . It is difficult to name with much accuracy its commencement to the west. The road from Cabul to south-west passes over no hill; to the eastward, however, of that line we find the valley of Cabul divided from the country to the south by the low ridge of Logur, which still more to the east rises into lofty mountains; these continue to the Indus, holding their course somewhat to the south of east. They even cross the Indus into the district of Attoc and divide (though not accurately) Chhuchh from the Khatirs. Even the hill of Husunubdal from its position and its composition almost seems a detached part of this range, which is of various altitude from the hills of the Khuttuks, seldom sprinkled with snow, to the white mountain, south of Jellalabad, ever crowned with it. The greatest altitude is about the middle, the least to the

east in this range, which is far narrower than the great northern one is generally much lower, and supports no considerable table land; on the corner it is true of the table land of Ghuznee rests on it. From this quarter (the west) the acclivity is gradual, but in most others it is rapid. The white mountain high in itself, appears still higher from its vicinity to the low lands of Jellalabad, whence it rapidly rises. The eastern hills also though so much inferior in height are usually steep and not easily practicable. The valleys within this range are in general narrow. From its southern side, and east of Jellalabad, it sends off one or more branches to the north-east, in the direction of Swat. This minor range which though low is difficult, forms the boundary to the north-west part of the valley of Peshawur, and all the roads leading thence to Cabul pass through it; where it unites with the great range, it is called Khybur, and the constant inhabitants are chiefly of the Upper Mihmund tribe. To the north-east, in its further progress, succeeds the Ootman-Khel tribe, and here seems to be the greatest height.

12. None of its other branches deserve notice except what may be called the salt range, which proceeds from its southern side in nearly the longitude where commences the preceding, and holds a course to the south-east. At its junction it is inhabited by the Oorukzyes. At a short distance further it forms the country of Upper Bungush, and afterwards continues to Kalabagh on the Indus, and beyond that river to the vicinity of Pind-Dadun Khan, on the right of the Vehut. Its greatest height is at its commencement, but even there it is not very great. In some places it is easily practicable, in others not.

13. Another range runs nearly parallel to that of  $34^{\circ}$  in the medium latitude of  $32\frac{1}{2}^{\circ}$ . Eastward it may be said to begin at the Pezoo pass, and westward it seems to end near Mookr. It supports the south-east corner of the table land of Ghuznee, and in that quarter is of gradual acclivity and a tame character, although the absolute height be considerable. To the east it is more rugged. In height this range on the whole yields to that of  $34^{\circ}$ , for it contains no mountain which bears snow throughout the summer; the eastern part however does not diminish to that lowness which the eastern part does of the range of  $34^{\circ}$ . I know of no considerable height it sends off, but we are not to forget that short range which appears to unite its western extremity with that of the range of  $34^{\circ}$ . It is the eastern buttress of the table land of Ghuznee to which it has a gradual declivity, while to the east it descends with the utmost abruptness, forming a very difficult country, in which live some tribes who quite set at naught the royal authority;



the Jadrans are the chief, and from them those mountains may with propriety be named. They are of a height on the whole not superior to the range of  $32\frac{1}{2}^{\circ}$ , unless the lofty mountain Bunseekun be considered as part of them. It lies towards their northern extremity, and is covered with perpetual snow. The longitude of the Jadran range is, by Lieut. Macartney's calculation, about  $69\frac{1}{2}^{\circ}$ .

14. The southern part of Afghanistan is in all things far more obscure to us than the northern, but chiefly we are ill informed respecting the conformation of the country. It is neither well peopled nor much civilized, nor frequently traversed. It appears to be neither mountainous nor plain, but diversified with numerous small and me-me-featured hills. Such a country is naturally in a warm climate and little productive. It certainly contains no mountain on which the snow does not melt before midsummer. The highest is the famous Tukhti Sooleman, called by the Afghans Kuseghur, which rising boldly from the low plain, right of the Indus, appears to the stranger the most conspicuous object, but is certainly far less elevated than the white mountain. From it proceeds a range of mountains in a direction parallel to the Indus, even somewhat beyond the most southern limits of Afghanistan. Their height is but moderate. I know not whether we can trace hills proceeding northwards from the Tukhti Sooleman and bounding Mukulwad and the Daman to the west, or whether the hills which appear from Dera Ismael Khan in that quarter be merely the ends of ridges running east and west, and among others of that of  $32\frac{1}{2}^{\circ}$ . Somewhat more to the north, however, begin some hills which extend for about 30 miles nearly parallel to the Indus, ending at the right bank of the Koorm. Those hills form a public range, and between is a sandy and barren valley known in the neighbourhood under the name of Largee. It is plainly formed from the ruins of these hills which are low and friable. The most eastern range closely hems in the Indus, and little arable land is left between, yet here live the Khusor tribe of Afghans, while the western range belongs to the Murwuts. The Khusor and Murwut hills are not properly comprehended in the southern Afghanistan, which may be considered as having for its northern boundary the range of  $32\frac{1}{2}^{\circ}$  or the river Gomul, or the 32nd degree of north latitude. The other hills of this tract need be but little expatiated on. The country slopes east towards the Indus, south into Bulochistan, and west into the Afghan Khoorasan, or country of the Dooranees. But it is difficult to assign the boundaries of those natural divisions, the western part, inhabited chiefly by the Kakur tribe of Afghans,

is more elevated than the eastern, where live the Sheeranees, Lohanee Oosturanees, and others, but these hills do not rise to a great height. We need not except even the hill Toba, lying 90 miles to the south-east of Candahar, which is now famous from having been during the last years of Ahmed Shah's life the cool summer retreat of that monarch.

15. Bulochistan is in general a flat and arid country, yet is not destitute of hills. We may trace a low range from near Sihwan, in a direction somewhat to the west of south and parallel to the Indus almost to the sea-shore. At Sihwan it appears to change its direction and instead of proceeding north to a junction with the Sooleman range, as represented in former maps, passes north-west, and ends some stage short of Jellalabad of Seestan. On this range is situated Kilat nearly where it is highest. The mountain called Maran, which lies two days north of that place, is the only one in the range which bears perpetual snow. By this range Seeweestan is separated from the tract to the south-west inhabited by roving tribes of the Rinds in which Kirachee is situated, and the roads are said to be difficult. Towards its termination to the north-west this range seems to connect itself with the hills of the Kakurs; there are other hills in Bulochistan which however seem irreducible to any chain. Kilat and whatever lies west of Seeweestan is commonly reckoned part of the geographical division of Khoorasan. Kirachee is perhaps part of Hindoostan, and Seeweestan certainly is. Sindh is a champaign country. Bhukhur however situated on a low hill or rock insulated by the Indus, but which may be considered as a prolongation of a low range which runs from the left bank of the river in a south direction diagonally into the desert, ending in the space of 30 miles. Jesulmer in the centre of the Indian desert, is built on an insulated low hill. The country of Kuchh which lies between the desert and the Indian ocean is a hilly one.

16. We have seen that the range of 34° and the salt range cross the Indus into the Doab of the Vehut and Indus. This Doab has several branches from the great northern range which run in directions very far from parallel to the preceding. The most remarkable is that which separates Chhuchh Hazara, the Khatirs, and other districts on the west and north-west, from Pothwar on the east and south-east. Towards the commencement of the range live the Gukhurs, a tribe which has been famous in history. Here is the chief elevation, which is not moderate. This Doab has also solitary hills or small ranges, but is clearly derivable from any of the above-mentioned chains. The shape

\* I use the term as our geographers seem to do, the natives employ it seldom, and give it a wider application.

and conformation of the country is thus very irregular, and the natural character of the portions very various. The hills and ranges (if indeed any there be) of Seestan and of all parts of Khoorasan are equally irregularly disposed, and cannot in writing be brought clearly before the mind. Few indeed rise to a considerable height.

17. Having concluded our sketch of the ranges of mountains, we now proceed to enumerate the various natural divisions thus formed and marked out. Some have been already mentioned, Kashkar lies north of the great northern range and east of the Belur; to the east is the country of little Tibet. Both are lofty and cold countries, and both seem to be more plain to the north and more mountainous to the south. The Upper Indus is perhaps the boundary. Little Tibet, or a part of it, is by some called Balteestan, from Baltee a Pootoman tribe inhabiting it, but the majority of the people seem to be in little Tibet of the system of religion known in the great Tibet lying to the east of Kushmeer. Little Tibet and Kashkar are as yet independent of the Emperor of China, who never entered them nor sent his troops thither, still less has he ever threatened Budukhan; but part at least of the Pamer is annexed to the Chinese Tooristan. This extensive country is formed by the northern slope of the great upland track already mentioned (7, 8.) and by the tracts to the north as far as the Altaian chain (8.). Its eastern boundary is unascertained, and probably very uncertain, or marked by desert tracts. Although the whole be firmly attached to the Chinese empire, in which it forms the most western province, it is not under one governor, but many, who seem to be dependent only on the court at Peking. We may distinguish Kashghur and Yarkund in the south-eastern angle, Aksoo to the NNE., Ela and Toorfan in the NE. and Khootun (which is not a city, but a country containing seven towns) in the centre. The great majority of the people are of the Toork race, and hence I have called it Chinese Toorkistan. To the north, however, are tribes of pasturing Calmucs; and perhaps this vast province contains some part of the Kobee nation, which although its chief seat be to the east, in the wastes called the desert of Kobee or Sham, yet spreads west into Kashkar, and constitutes the chief population on the banks of the Kashkar river. On the course of this river we find four principalities, and in all, the chiefs are of this race; the highest is the most powerful, and extends his dominion to the right of the Indus, and the mountains north of Swad. These particulars are here the less misplaced, that the countries in question have ever been among the obscurest in Asia, and even the latest inquiries have

but little elucidated them. In future they will be but seldom mentioned.

18. We have already seen that the Belur and Alak chains divide the Chinese from the independent Toorkistan, which stretches then west to the Caspian, and its three natural divisions into Toorkistan this side the Oxus. Toorkistan, between the Oxus and Jaxartes, has been mentioned. The boundaries of the last division to the north where it touches the Russian empire, are supposed to be defined by no great river or mountainous chain or other natural line. Geographers name minor ranges of hills in this division, but it is certain the far greater part is occupied by plains. This is still more true of its western than its eastern parts, and the former in consequence is scarcely an agricultural country, while in the latter we find the greater part of the dominions of the civilized state of Tashkund, a part of that of Kokun, but the capital of that principality and the greater part of the dominions lie in the middle division of Toorkistan. The east of this division contains in addition to Kokun, Keeratege, Wukheet a part of Durwaz, and nearly the whole of Hissar, with some other petty states. All these are hilly countries, and with the exception of the last, they may all be called mountainous; the valleys are of various widths, but generally narrow, and the road from one to another difficult. Durwaz is particularly narrow and impracticable; it lies on the Punj or Upper Oxus, and its princes were of a race which claimed descent from Alexander the Great. By late account the living representative has been expelled by the Keerategenees.\* To the west of this middle division we find Shuhr Subz, an inconsiderable state, and the dominions of Bokhara, which is the most powerful state in Toorkistan. The mountains of the east enter this tract, but diminish in their progress, and at length disappear. The west is therefore an open plain with the exception of the district of Noorut in which we find the Akhtan hills. These are of moderate height although the name would lead us to judge otherwise. The height of the whole has no snow beyond the middle of April. The extent of the range is not great, and no stream originates in it. The parts of this division of Toorkistan which border on the Aral lake, or sea to the west, are flat, sandy, and uncultivated; and the like is true of the opposite tracts beyond the Jaxartes and of those beyond the Oxus with the exception of Khwaruzm. This was in ancient times the centre of a powerful kingdom, but now its weight is but small; it

\* Not expelled, but deprived of part of his dominions (December 12th).



foreign dependencies have passed into other hands; the blowing of the winds has submerged part of its territory, and the productiveness of the remainder has been lessened by the change artificially made in the course of the river Oxus. Mr. Pinkerton has expressed his scepticism in regard to the fact, and it may well be questioned whether the whole of this river was on that occasion turned; but the accounts in the history of Toorkistan assure us that in the — century, the Calmucs did divert a great stream which passed west through the kingdom of Khwaruzm, and made it to run where now runs the Oxus into the lake of Aral. Khwaruzm still has its stream artificially drawn from the Oxus, and which is indispensable to its cultivation and existence. At no great distance from the river commence deserts, which extend to the Caspian, and are traversed by the pasturing tribes of Toorkmans (who moreover possess the sandy banks of the Oxus from Kelif downwards) and some other tribes. The chief city of Khwaruzm is Oorgunj.

19. Bactria, the only remaining part of Toorkistan, lies on the left of the Oxus during its middle course. It is now distinguished into several sub-divisions according to the remarkable cities and the existing distribution of dominion. Beginning from the quarter of Khoorasan, first occurs on this side the Murghab Kuburmach of the Jumleedees, which tribe however living chiefly on the left of the Murghab for this and other reasons (4) we must assign it to Khoorasan. From Kuburmach proceeding in a direction not much different from N.E. we come at the distance of 30, 56, 20, 24, miles to Myana, Undkho, Shibirghan, and Bulkh, capitals of little states now independent. The traveller has to his right branches of the Paraparnisan, which are generally visible; he pursues his journey in a cultivated or cultivatable country, but beyond it to his left begin sands which continue to the Oxus. That river here holding a course to the north of west while his course is to the north of east, and the cultivatable country being usually of an equal breadth, the tract of sands beyond it is necessarily widest to the west. With Bulkh begins a country of a different character; the Paraparnisan still lies to the south, but the Gavee Paraparnisan, moreover, to the south-east, intervenes between this country and Cabul; and to the east, towards Budukhshan, are branches from the Hindookoosh. Hence is this tract very diversified, and while the south and east are generally hilly or mountainous, the north and west are generally level. Bulkh is itself level, but has dependencies among the valleys of the Paraparnisan to the south. From Bulkh, the very long day's journey of that quarter to the east or south-east,



lies Khoollum, which to the east rises into hills and mountains; the place is subject to Bulkh, the chief of which extends his dominion to within two days of Bamian, where begins the government of the Afghans. The intermediate country is hilly and poor. The chief of Bulkh has influence in the remaining part of Bactria, which lies to the east. Talikan alone is a hostile state, and is independent. Its hills are however less lofty and difficult than those of Ghoree and Khost to the south. Between Ghoree and Khost is Undurab, which is a mountainous tract. Koonduz lies to the north-west of those places, being on the road between Bulkh and Talikan, four days from the former and one from the latter. It is a level and fertile tract. If to these we add Huzrut Imam, situated thirty-five miles below the junction of the river Koocha with the Oxus and under Hissar, already mentioned, as a state beyond the Oxus, we have enumerated the chief remarkable districts in Bactria.

20. The river Koocha in its upper course intersects Budukhschan in its lower boundary, the eastern and southern boundaries have been already mentioned. Its northern limits are more difficult to assign. The natives seem at present to restrict it to the country political under the chief of Fyzabad (who is a Syyud and is styled Shah) which many consider as a convertible term for Budukhschan; it is situated on the left of the Koocha, five days east of Talikan. It is not easy to discover what extent the majority of European geographers wish to give to Budukhschan, but there seems little or no authority for extending it beyond the river Oxus, and it seems convenient to have a general term for the tract of country which the upper course of the river bounds. It is a diversified country, but its general character is ruggedness and poverty. The valleys are narrow, the mountains steep, the streams rapid;—by far the greater part is subject to Fyzabad. To the north beyond the river are Durwaz, Wukheeha and Kcerateg, already mentioned, and whose natural character is very similar.

21. The Gavee mountains which have been shewn to connect the Hindookoosh with the great body of the Paraparnisan, divide Bactria on the north-west, from Cabul on the south-east. One of the most frequented roads passes through Bamian and Goorbund, which are narrow tracts. The delightful valley of Cabul is open only to the south, where some inconsiderable heights divide it from the table land of Ghuznee, which here inclines to it. Cabul is politically divided into four tuppas or districts, Logur to the south, Kodamun to the north-west, Pughman to the west, and Bhootkhah to the east. To the north and north-west is what is called the Kohistan or highlands of Cabul,

which the chief valley is that of Punjsher; Ghoshund and Bamian are not included in this term, and lie more to the west within the skirts of the Paraparnisan. East of the valley of Cabul, after a considerable descent, we arrive at the country of Lughman, lying low, under lofty branches of the great northern chain. It is situated to the north or left of the Cabul river, is on the right in the most frequented roads from Peshawur to Cabul, and is of an extent far inferior to that of the valley of Cabul. To the south-east it borders on Jellalabad, a city and district on the right of the Cabul river, diversified with mountains, hills, and plains; its plain is somewhat less spacious than that of Lughman. The city of Jellalabad is passed in all the roads from Peshawur to Cabul, between which places it is nearly intermediate. To the south is the White mountain, the loftiest of the range of  $34^{\circ}$  north, and north-east of Jellalabad beyond the Cabul river is the narrow valley of Koonur, lying on the left of the Kashkar river, which joins that of Cabul opposite Jellalabad. To the west of Koonur lies Lughman.

22. In the enumeration of the chains of mountains, have been already mentioned a branch proceeding from the great northern mountains along the left of the Kashkar river (6) and a branch or branches leaving the range of  $34^{\circ}$  to the east of Jellalabad, and running in a north-east direction (11). The detached branches of these appear to unite, and together they divide the various districts already mentioned, from the greatest of the plains, which are situated between the great northern and the  $34^{\circ}$  chain of mountains. This great plain lies from the foregoing in easterly directions. Although there be no complete interruption to the continuity of this plain, yet do the strait roads between its detached portions sometimes pass over branches from the mountains which bound the whole; that between Peshawur and Bajour conducts north-west, through the Mikmund or Ootman hills (11); we may therefore distinguish Bajour, with the adjoining districts of Punjkera, from the remainder of this great plain which may be called from Peshawur the greatest city it contains. Bajour is peopled by the Purkulanee tribe of Afghans, who are not a part of the Yoosufzyes as supposed by Major Rennel. The chief inhabitants of Koonur are the Degans, who here speak a peculiar tongue. Punjkora is so called as being peopled by five houses or branches of a subdivision of the Yoosufzyes. The plain of Peshawur after those reductions is still comparatively spacious in a country so mountainous as Afghanistan. To the north it has the great northern range, which sends branches into it, forming the upper parts of Swad and Bhooner, while

the lower are level ; to the south it has the range of  $34^{\circ}$  ; and to the east the Indus. Its western boundary has been already detailed. The Yoosufzyes are a numerous tribe, who disregard the royal authority.

23. South of Cabul is the table land of Ghuznee, the boundaries of which to the east, north, and west, have been already mentioned. To the south or south-west it slopes into Khoorasan. It is far from being a perfect plain, having many slight inequalities. Proceeding eastward, we find the Jajee valley, that of the Torees, and others proceeding from the south side of the range of  $34^{\circ}$ , and some of less note which penetrate into that of  $32^{\circ}$  and the Jadran range. At a considerable distance to the south-east is the valley of Bunnoo situated between the salt range, and the range of  $32\frac{1}{2}^{\circ}$  towards its eastern extremity. It is of an extent far inferior to that of Peshawur. A branch of the salt range divides it from the narrow territory peopled by the Eesa Khel tribe and others to the north-east. It lies on the right of the Indus, and terminates to the north, where that river is closely hemmed in at Kalabagh by the hills. These hills divide it to the north-west from Malgeen, as they divide Malgeen on the north from Bunnoo on the south. Kohat lies still more to the north under the range of  $34^{\circ}$ , and to the west it has Upper Bungeish, a hilly tract. Both Malgeen and Kohat are diversified moreover with very low hills, which seem generally to be from east to west. Neither are spacious.

24. The Eesa Khel plain is bounded to the south by the river Koorm. Beyond that river seems to begin what is by the natives called Daman, a term strictly meaning the lands at the foot of a range of mountains or hills ; in this instance it has perhaps a more general meaning, and includes even some low hills of this quarter. It ends to the south at Sunghur, where begins Sindh. Like most other terms partly descriptive partly arbitrary, it is not by all used in the same latitude, and it seems doubtful whether we are to include in it the tract in which is situated Dera Ismael Khan, and which the natives call Mukulwad. It lies on the right of the Indus, which bounds it to the east. The hills are here at a considerable distance from the river but both to north and south they approach nearer it. The Daman most strictly so called, lies west from Mukulwad. I know not whether it be considered as extending to the south, between Upper Sindh and the Soolecmanec hills (see Para. 14.)

25. There being little to add respecting the southern parts of Afghanistan not comprehended in Khoorasan, we may proceed to Sindh

beginning as before mentioned at Sunghur, a place lying in north latitude  $30^{\circ} 40'$ , and east longitude  $70^{\circ} 45'$ . The term Sindh seems to have been originally descriptive; Sindh in the ancient Hinduwee signified ocean, or great river. The people inhabiting the borders of the Indus in process of time applied it to that river as being the greatest and most important; they knew rivers are in all countries great features of a country, but chiefly where it is low and champaign; we need not therefore be surprized if in such cases the tracts lying along the various rivers be named after them. This practice has probably been more general in former times, before foreign conquest introduced new and arbitrary terms, and fiscal or political divisions were adopted, little coincident with natural ones; the last, however, are those chiefly recognized by the cultivators, and various instances still remain to exemplify the principle just mentioned. Were it applied in strictness, Sindh would include all the country at a moderate distance from the river Indus, from its exit from the great northern mountains to the sea. In modern times at least other distinctions have quite superseded the term, if ever applied to the upper course of the Indus. It still remains applicable to the lower, during which it is that this great river is of most importance to the subsistence and comforts of the inhabitants. From Sunghur to the sea, the low fertile country to the right of the Indus is named Sindh; whether on the left bank of the river it ascends to the same latitude seems doubtful. On the one hand Buhawulpoor on the Ghara, at a considerable distance from the Indus, is considered as comprised in Sindh; on the other, Mooltan cannot be denied to lie in the Punjab. Leaving this in uncertainty, we may remark, that from Sunghur to the sea are three natural divisions. 1st. The most northerly in which lies Dera Ghazee Khan, and which may be called Upper Sindh, it may be said to end with the Sooleema-nee hills. 2nd. The middle division, comprizing the country of the Muzarees, who are independent Beeloches, and south of them the district of Shickarpoor. 3rd. The most southerly, now under the government of chiefs of the Talpoora tribe—this may be called Nether Sindh. To this alone it is that in our maps is given the name of Sindh or Sindhee, but all authority of native writers or native use is against this restriction, which if persevered in, must give rise in our dealings with the people of the country to frequent mistake. Sindh is a narrow champaign country. Its greatest width is in the middle division, and near the sea where the Indus forms a delta. The length may be 400 English miles and the average breadth 50. To the south is the Indian ocean, to the east is the great Indian desert, and



beyond it the Rajpoot states. The country of Kuchh extends from the most southern part of Sindh, in an eastern direction, towards Goojr. It lies along the Indian ocean, and the name seems originally to have implied 'border or edge', but as the lands bordering rivers are usually low, Kuchh, Kuchhee, and other words from that root seem now in numerous cases to mean low and moist lands near rivers. To the north, Sindh has Mukulwad, the Daman, and the Punjab.

26. West of Sindh lies Bulochistan, there is here however a tract of country which is to be distinguished from both; if included in Bulochistan, it would form its north-east corner, and it lies west of the middle and of part of the upper Sindh; Aboolfuzl seems to have called it Seeweestan—a general term now little in use, but very convenient for us to retain. It contains Seewee, Gunduwah, Dhadi Laree Bhag, Naree, perhaps Hurnd and Dhajul, and some other towns and districts. It is itself a plain, but has in most quarters low hills for boundaries. A hilly but by no means mountainous tract intervenes between it and Candahar, and in that tract live the Tureens and some other Afghan tribes, while to the traveller's right hand are the Hakurs. At Gunduwah begin hills, and the country is hilly to Kelat a distance of 120 miles in a direction about north-west. Kelat must be considered as the capital of Bulochistan, though not the greatest city. The surrounding country is but poor. In the western part of Bulochistan are the cities, towns, or districts, of Keech Mikran, Punjgoo Dezuk, Bempoor, and others; this last is nearly SSW. of Jellalabad the capital of Seestan, from which it is distant 13 days journey. Of these the three only nearest to Jellalabad are inhabited when the direct road is chosen, but it is said there is a road more to the east which conducts through a country generally inhabited. From Bempoor to the sea it is said to be ten days, and to the first town Kirnan five days. In both cases the country is reported to be inhabited. On the coast of Bulochistan are some harbours of which the most noted is Kirachee, the longitude of which is not very different from that of Kelat. Nearly intermediate between them is Bel. The information is very scanty which is to be gained concerning Bulochistan, a circumstance which perhaps evinces it to be a country little productive or practicable. The chief population of Seeweestan is Indian, but the Beeloches are generally speaking the masters of the country. They are themselves divided into two nations, which were probably distinct in early times. The Koorgal nation is the superior and its residence is chiefly in the west, and in the hilly tract where it is situated Kelat. The Rind tribes dwell in the eastern quarter



and are also the chief population of the south-west, so that in numbers they exceed the other nation.

27. To the north of Seeweestan lie the countries of various Afghan tribes; to the north of the western part of Bulochistan lies the country of the Bureches, that of the Dooranees, and Seestan; but the country of the Dooranees stretches a considerable distance beyond in a north-westerly direction. All these are included in Khoorasan. From Candahar to Hirat is a distance of 300 miles from ESE. to WNW. On the traveller's right is the Paraparnisan range, on his left Seestan, in which the capital Jellalabad lies 150 miles west by south from Candahar. From Jellalabad nearly due west, at the distance of 190 miles, is Nih, which though under a separate government is perhaps to be considered as in Seestan. From Nih the country of Ghaeen and Yarkund lies north, and is of considerable extent. It lies from Hirat north-west, and from Furah (a considerable place on the left of the road between Candahar and Hirat) west. From Ghaeen, north-west, are Muroshish and Mushhud, which last place lies from Hirat more in a westerly than northerly direction. The country of Khaf lies west of Hirat, and north-west of it, towards Mushhud, is that of Toorbut. Jamrud and Murv lie to the north. The Afghan dominions end a short distance to the west of Hirat. These divisions which have been enumerated are political ones. The face of the country is too little known, and even if known, is probably too irregular and diversified to be distributed into natural divisions of well marked characters. But the country of the Ymaks, lying to the east of Hirat, is distinguished from all the others as being decidedly hilly, though indeed it possesses some wide valleys and some plains contiguous to the hilly tracts. Of these last the chief is that which lies north from the hilly tracts, but forms part of the north-east boundary of Khoorasan, and in which is situated Huburmach, a place already mentioned. To prevent mistakes it may be observed, that though this tract in general may justly be called the country of the Ymaks, part of that nation is found at some distance from it.

28. We have now rapidly sketched the countries lying west of the Indus, or north of its sources, and proceed to those lying eastward of it. Little Tibet has been already mentioned. It seems to be a country not easily practicable, for we are informed, that the trade from Kashmeer to Yarkund once passed through it because of the road by great Tibet having been forbidden, and that this was considered as an inconvenience. It is certain, a strait line between Kashmeer and Yarkund would pass through the little rather than the great

Tibet, and hence the objections to the former road must have been its difficulty rather than its circuitousness. Little knowledge is to be gained of either country, but they are known to be poor. Great Tibet extends far to the east from Kushmeer, while the little lies west of that country. Little Tibet is as yet quite independent, except that a few of the low situated villages are now subject to the governor of Kushmeer. South-west of little Tibet, on the banks of the upper Kishengunga, is the independent territory of the Durand which is very little known.

29. The delightful valley of Kushmeer has already been accurately described by Forster. West of it lies the district of Moozufferabad abounding in low hills, and beyond it is Pukhlee, which consists partly in hills of considerable height, and partly in a plain or valley lying on the left bank of the Indus. South of it is Chhuchh and south-east Huzara, of which both are plains. The former lies opposite the lower part of the plain of Peshawur, while Pukhl is opposite to Bhooner. South of Chhuchh is the country of the Khatirs, and beyond them that of the Uwans, Dhuns, Gheps, and other tribes. The eastern part of this Doab of the Indus and Veh is chiefly occupied by Pothwar, a country now in subjection to the Sikhs, but the exact limits of which are not easily assigned. A range of hills divide it from Huzara and the Khatirs. This Doab as before observed, has numerous hills, and though low, they are sometimes very difficult. Where they end to the south begins the country of Mohummud Khan of Lya, which is here sandy and is approaching to a desert. This and the other tracts as far as the mouth of the Indus are sometimes known by the name of Lumha, which means in the local dialect, 'south.' The territories of Mohummud on this side the Indus consist of high sands more remote from the river and a lower and more fertile tract by its banks. The former is named Thul, the latter Kuchhee, both descriptive terms. Of the Kuchhee the southern part at least must be considered as in Sind. Towards the angle of this Doab to the south the Thul is lost, and the lands are low, moist, and fertile.

30. The whole of this Doab of the Vehut and Indus has no name in general use. That of Sindhsagur given it by Akbar, is known only to the readers of the Aycen Akbery, nor are any of the names given by him to the Doabs of the Punjab in common use. It seems doubtful whether that of the Vehut and Indus is to be considered as part of the Punjab, which many consider as restricted to the space included between the Vehut and Sutluj. To the south-west

flows to a point where the five rivers are assembled in one stream, and to the north-east it is bounded by the great northern mountains. Within these mountains are many independent states, and also some dependencies on Kushmeer, for instance Poonuch and Rajwer. From Jelum on the Vehut to Lodhiana on the Sutluj is about 250 miles of road distance. The Punjab thus restricted is a country universally plain. From Lodhiana to Delhi is 220 miles of road distance, through a flat country; at some distance to the traveller's left, or to the south-west, begins the great Indian desert, which extends near the sea, dividing the lower Punjab and Sindh from the Rajpoot states. Of these we may mention Jodhpoor to the south, and Beekaneer more to the north. Bhutner lies at the northern extremity of the desert, in a country not naturally unfertile.

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### *Rivers.*

31. Of the rivers in these countries the greatest is the Indus, some have considered it as the boundary of Hindoostan to the west. Both now however, and formerly, we find the Hindee race and language far to the west of the Indus from its first exit from the great northern range to its falling into the sea. It must be considered an unnatural arrangement which should assign the eastern part of the narrow country of Sindh to India, and the western to Persia or Bulochistan. Other boundaries less simple and marked must therefore be sought for. By the inhabitants of Sindh this great stream seems best known under the name of the river. The Punjabees and people in general of the Hindee race distinguish it as the river Sindh; Persians and Khooranees either soften this into Sind, or name the river by the addition of some conspicuous town on its banks, a practice not unknown even to the inhabitants themselves, hence it is best known to many as the river of Attoc. The Afghans have called it 'Ubaseen,' that is father or venerable river; *seen* in their language signifying river. But if we trace the stream thus distinguished by them, we shall find they have selected the lesser, instead of the greater and more remote branch. The Ubaseen of the Afghans rises in the southern face of the great northern chain only 120 miles in a NNE. direction from Attoc. About ninety miles from that place it falls into the true Indus, which comes more from the east. The course of the true Indus is but conjectural, but may be safely said to be long and its source remote, in the table land (see para. 7.) From where it leaves the lofty mountains to the sea it runs in a direction  $24^{\circ}$  west of south, and though it have many

windings, it takes few great sweeps. As far as Attoc it is a rapid river, but at Kalabagh, distant thence 80 miles, it is very slow and still; it is no longer confined on both sides by hills, though to its right are sometimes found hills, and assumes all the well known characters of a river flowing through a champaign country and yielding soil. At Kuher after having been joined by all the waters of Afghanistan, it is in the ebb season about 1000 yards broad, and where deepest twenty feet deep, with a current of two and a half miles an hour. Not far from Mithundakot it receives from the left the Punjnud, in which are collected all the waters of the Punjab, but which is yet much inferior to the Indus. After this junction, that river probably exceeds the Oxus in quantity of water.

32. The Hydaspes is the most westerly of the five rivers of the Punjab. This name originally imposed by the Greeks, is an evident corruption from Vidusta or Velusta, its ancient name in the country and which the natives of Kushmeer still retain; by the Punjabees it is called Vehut, which the people of our provinces change into Behn, strangers in general usually name it the river of Jelum, from a town of that name built on its left bank in north latitude 33°. Here is a famous ferry, and in the ebb season it may be forded, though with some difficulty. Here too the Punjab may be said to begin, for in northerly directions are mountainous tracts. The Hydaspes rises in the valley of Kushmeer, and having a slow current in deep mud banks, soon becomes navigable. Before leaving the valley it joins from the north the Lar river, so called as intersecting the district of that name. After leaving Kushneer the Hydaspes becomes rapid and unnavigable. At Moozufferabad it receives from the right the Kishengun, a far inferior stream rising in little Tibet. Various mountain torrents now add their waters, and arriving at Jelum it has gained almost its utmost size. Until it reaches Pind-Dadun Khan, it is at intervals confined by hills on its right; at Rusheedpoor it falls into the Acesines; near Ahmedpoor the joint river receives the Hydraotes. The Acesines, as being the largest and central gives its name to the three, which thus united in one stream pass Mooltan, lying about six miles from its left bank; and at Sheenec Bhukhuree, fifty-six miles from that place is their conflux with the Ghura, which contains the two eastern rivers of the Punjab. The five rivers thus assembled are called Panjnad. The Punjnud had formerly but a short course before it joined the Indus, and perhaps the term was not then used; but in consequence of an extraordinary rise of the rivers about twenty years ago, the channels were changed, and the Punjnud now runs for about fifty miles.



miles parallel with the Indus, which at length it joins opposite to Lithundakot.

33. The Acesines is certainly the largest river of the Punjab. In ancient times, as we are informed by Aboolfuzl, it was called Chunderbhaga, from its being formed of two mountain streams, Chunder and bhaga. The name Sandabilis used by the latter writers on India among the ancients, seem derivable from Chunderbhaga, but the etymology of Acesines is now obscure. The inhabitants of its bank at this day though not ignorant of the ancient appellation use not it, but Chunkâ, which we and the Persians have changed to Chunab. This great river rises in Kishtwar, a dependency of Kushmeer. There is little reason to think that any of the rivers of the Punjab rises beyond the great mountains in the table land. The Acesines is forded with difficulty even in the ebb season. The Hydraotes was formerly, in the country, called rawutee, and now Ravee. It is by far the least of the five rivers.

34. To it succeeds the Hyphasis, anciently called by the natives Bypasha, and now Beak or Beas, and lastly the Sutluj. The Sutluj was by the Greeks called Hesudrus. Its ancient name was Shutoodr, and in Peshawur it is to this day usually called Sutloodr; it is inferior to the Acesines, but seems equal to the Hydaspes; yet did the Greeks call the joint stream of the Hyphasis and Hesudrus by the name of the former, a much inferior stream. At present both names are lost, and the river formed of them near Feerozpoor is first called Neelee, and afterwards Ghara, or Ghuloo Ghara; it is no where fordable even in the ebb season, but both its branches are. We are informed by Aboolfuzl that in his time it separated into a number of branches at some distance below its formation. At present, although it have like other rivers of a champaign country small nullahs or branches, it no were sends off a considerable part of its waters. As before mentioned, it falls into the Acesines, nor is there any reason to think that when Major Rennell composed his map and memoir, it held a different course; yet has that excellent geographer rejected Arrian's authority for this fact, without assigning any reason.

35. Between the Jumna and Sutluj are various small streams, very important in a military point of view. The Kughur and some others fall into the Sursootee, a river the course of which has long been a problem. The late inquiries entirely confirm that account which is given in Franklin's life of George Thomas, by which it appears to be lost near Bhutner. There is however a tradition that in former times it passed to the south, and spread itself over the wide expanse of level hard clay in the centre and west of the great Indian desert.



36. By far the greatest tributary of the Indus from the right is the river running under Ukora and Noushuhra in the plain of Peshawar. Captain Wilford has called it the Lundkee Sindh, or little Sindh, a term partially used in the country; but it is to be regretted that in this case, as in very many other cases, rivers have no proper names as such, but are distinguished from the towns which may be on their banks. This river joins the Indus less than a mile above Attoc, but on the opposite side. It does not appear probable that it has ever passed under the name of the river of Attoc. Before the junction both rivers are fordable, but after it no longer so. The Indus is the larger in quantity of water, but being more rapid, the channels seem equal. The Ukora river drains a very extensive and various country. Its sources may be divided into western and northern. The most remote of the western are in the mountains which bound the valley of Cabul, which is watered by three principal streams. The least which rises to the south or south-western runs through the capital; there afterwards joins it another from Ghorbund, and still lower that of Punjsher, the largest of the three, and which rises in Hindookoosh; other small streams contribute their waters from the right and left, but the rapidity is such that with all these additions the river is not navigable even by raft until it join the stream of Lughman, which rises in the Kaper mountains to the north, and intersects that province. Although probably inferior in quantity of water, a gentler current admits of navigation on it by rafts before the junction.

37. Five miles east of Jellalabad joins from the north the Kashkai river, which is a rapid stream, and supposed to contribute three times the quantity of water brought by the united rivers of Cabul at Lughman; for about fifty-four miles the navigation of the river formed by these three streams is interrupted by no obstacle, yet are boats used in one place only (Dhukka) and there for ferrying merely; for about thirty-two miles further, to Micknee, occur at intervals, rocks, whirlpools, and cataracts, which are reckoned up to the number thirty-two. The river in this space pierces the secondary range of hills already mentioned (see para. 11.) A passage down the river is in no season impracticable on rafts, but it is safest in the flood season, for although the violence of the stream be then increased, greater depth of water removes all danger arising from many of the rocks. The upper Mihmunds who live chiefly on the left of the river along this dangerous tract, take advantage of the difficulties of the traveller to rob him or extort a ransom.

38. From Micknee to the Indus the river flows with a moderate

current through the valley of Peshawur, which it fertilizes. A short distance below Micknee it divides into two branches; the lesser, usually called the Shuhalum river from a village of that name, passes only four miles to the north of Peshawur. It unites twenty-five miles in a straight line from the point of division with the Hadezy or other branch, which had previously received from the north-east the river of Swad, inferior to itself. The river is now completely formed, and proceeds to the Indus a distance of thirty-five miles. It divides (though not exactly) the Yoosufzyes to the north from the Khutuks and other obedient tribes to the south. The Mihmudzy tribe inhabit chiefly the district of Hushtungur, lying on the left bank of the Swad river. In the Doab between it and the Hadezy live the Gugeeanees, and the upper Mihmunds and Ootman-Khel tribe bound them to the north and west. In the island of Hadezy and Shuhalum live the Daoodzyes; south of them and the Shuhalum are the Khuleels, who live chiefly to the west of Peshawur, and the lower Mihmunds who live chiefly to the east of it; to the east of them are the northern Khutuks. The people of the south of the plain draw but little water for irrigation from the river; their neighbourhood to Peshawur and the great road exposes them to oppression and military rapine. The canals which formerly existed are now in a state of complete or partial decay. The Boodhunee however which rises from springs in the plain is increased to twice its natural size by the introduction of water from the Shuhalum. The Bara is a more important stream, though in size very inconsiderable. It rises to the south-west in Teera, a well peopled district, situated high on the range of  $34^{\circ}$ , and diversified with hill and plain; whatever is suffered by the Afreedees, or people of that country, to flow to the plain, is by the government appropriated in the following manner—A certain quantity reckoned by the number of mills it can (if required) turn is taken for the use of the city and gardens of Peshawur. The remainder is to be equally divided between the lower Mihmunds and the Khuleels, but no rule has been established which does not give rise to unceasing jealousies and suspicions between these two parties, which often break forth into open war.

39. If computed from its western sources to its mouth, the general course of the Ukora river is a little to the south of east, according to the direction of the range of  $34^{\circ}$ , and in length, in a strait line, about 200 miles; but its greatest streams come from the north. The Kashkar river rises remote in the table land. Before piercing the great northern range it receives from the east the Sheesa, which rises

behind them, contrary to the Ubaseen. After crossing the line of the great northern range it still remains hemmed in by its branch (see para. 6) and continues to its mouth a rapid stream. It is navigable for rafts only as far as Asmar, seventy-five miles from its mouth; thence upwards it is exceedingly rocky. In the ebb season it is fordable by horsemen in various places, and in some, a party of men on foot, by joining hands, can with difficulty cross it. At Chughsuræe receives from the right the stream of Pech, running in a valley of that name, through which leads a road north-west to Budukhsa. The other northern stream is that of Swad, which has a general course from the north-east. Arrived in the plains it is joined from the north-west by the inferior stream of Punjkora. They unite near Khizree Khel, forty miles from Peshawur.

40. The other additions to the Indus are but inconsiderable. Pukhlee and Bhooner have their rivulets and torrents, and in the former may be noticed the fern much used in agriculture. The Huro rising in the territory of the Gakhurs (see para. 16) intersects Huzara and part of Chhuchh, but leaving it falls into the Indus between Attoc and Neelab, in the country of the Khutuks. The Swan, a much superior stream, rises in the district of Moozufferabad and passing through Pothwar and some other districts of the Doab joins the Indus some miles above Kalabagh. The To rising in upper Bungush and Teera, waters Kohat and falls into the Indus after a short course. Malgeen has its rivulet. Bnnnoo is well watered by the Koorm. This river has very numerous sources draining the left of the salt range, part of the left of that of  $34^{\circ}$ , the Jadra range, and the right of that of  $32\frac{1}{2}^{\circ}$ . Perhaps the chief is that which is traced to the White mountain, in which case the Koorm has a course from north-west to south-east. Its greatest tributary is the Gumbeela, rising in the western part of the range of  $32\frac{1}{2}^{\circ}$ ; even at its mouth the Koorm is but a small river, and probably discharges not more than a tenth of the water discharged by the Ukora river. Still less is the Gomul, whose course is near the south or right of the range of  $32\frac{1}{2}^{\circ}$ . It does not in ordinary times reach the Indus, but is expended in the agriculture of the Daman. After heavy rain however it exceeds the demands made on it, and spreads itself over the Daman and Mukulwad on its way to the Indus.

41. In Afghanistan, south of the Gomul, and in the whole of Bulochistan is no stream of magnitude or whose waters reach the sea; it is in like manner with the Persian Khoorasan; but in the Afghan Khoorasan are some considerable ones. The greatest is the Kelbun

which rises contrary to the Ghorbund stream. After running a considerable distance in the Huzara country it enters that of the Toranees, and passes to the west of Girishk. It finally discharges itself into the lake of Seestan. It is a rapid river, especially during the first part of its course, and the quantity is certainly considerable in the summer, but Mr. Forster who passed it at Girishk on the 17th November, 1783, describes it, without naming it, as a small stream of cold water. In the ebb season it is fordable in certain places, but in the time of the floods must be passed by means of boats or by means of pumpkins. Except towards Seestan, where the bottom is composed of sand only, the channel has a mixture of stone and sand. The banks are generally high, and the river never sends natural branches a considerable distance. Art however has drawn out some canals. The most famous is that made by the late Payenda Khan Barukzy, and lately repaired in the midst of civil broils by his son and successor Akteh Khan. It is drawn from the right of the river. The general course of the Helbund is about south-west.

42. Not far below Girishk it receives the Urghundab from the left. This stream is of far inferior magnitude, and in the ebb season is easily fordable in all places. It rises in the south-eastern extremities of the Paraparnisan, not far from Sooltan Safee, and has Candahar not distant from its left bank. It is afterwards joined by the Turnuk, rather by a part of that little stream, for another part is lost in the sands. The Turnuk drains part of the Kakur country and of the fertile land of Ghuznee, and is reckoned to have its principal source near Mookr. Equal to the Urghundab is the Khashrood, that stream which runs under Dilaram to its right. It rises in the Paraparnisan plain, and after a course nearly south falls into the Helbund near Mohinsheen, three days journey below Girishk. The Furahrood, so called from Furah, which is situated on its left bank, also rises in the Paraparnisan, but from parts of it more westerly; it never joins the Helbund, but pursues a separate course into Seestan, where according to some accounts it gains the lake; but according to others, is in the ebb season at least lost in the sands. It is twice as large as the Khashrood, and its course seems to be south-east.

43. Such are the streams which take their rise in the south side of the Paraparnisan. From the west rises the river of Hirat, called by the people of Khoorasan 'Pool-i-Malan,' and by those of Toorkistan 'Fejun'; it is the Ochus of the ancients, and is said formerly to have reached the Caspian sea. At present it is lost in the desert south of the Oxus in a direction north-west of Hirat. It is twice crossed in



the ordinary road from Candahar through Hirat to Persia. Except in the season of rain it is very small, and much of its waters are expended in agriculture. The ancient Margus or modern Murgha whose sources are not far distant from those of the Oxus, is perhaps an equal size. It runs nearly due north, and after passing Muro, some distance to its left, pursues a solitary course through sands to the Oxus, which it barely reaches. A considerable rivulet from the Paroparnisan, waters successively the districts of Mymuna and Undklo, but never gains the Oxus. Bulkh has eighteen streams, but of those none are canals drawn by art from natural ones, rising in the mountains to the south. None of them can aspire to the name of a river. The chief called the Bulkhab is the chief. Advancing eastward we come to the stream of Khoollum, and after it, that of Koonduz, which is more considerable, and composed of three principal branches draining Talika, Ishkumish, and Ghoree. This last is the most to the west or left of the three. The middle one it is which is sometimes known by the name of Bungee. The river composed of these three streams is equal to the Oxus, and pursues a north-westerly course to the Oxus.

44. That great river, according to information received by Lieut. Macartney, rises from a glacier of the Poosht-i-Khur, a lofty mountain of the Belur. The natives of the country content themselves with tracing it to Durwaz, and usually confess their ignorance of its earlier progress. The first considerable stream it receives is the Soorkhab, the river of Keerategin, it afterwards joins the Koocha from Budukhsheh and the Oxus now ceases to be fordable. From being very rapid and precipitous, it now gradually assumes the character of stillness, and gently glides over a sandy bed to the Aral lake, where it is lost. Besides the tributaries already mentioned, the Zurufshan, or river of Ishkhara, joins it when flooded; it has a south-westerly course. That Keerategin runs nearly south, the Koocha north-west. The Zurufshan is but an inconsiderable stream in quantity of water, but is indispensable to the agriculture of Samarkand and Bokhara. The Oxus is by the natives of Toorkistan called Umoo, a name which strangely changes to Hamoo; but during its upper course among the mountains it is called Punj. Its course is not much to the north of west.

45. The extreme sources of the Jaxartes are not far distant from those of the Oxus, but it holds a more northerly course. Towards its mouth however it is said again to approach the Oxus, and according to some it actually joins it before it falls into the Aral. In size it is much inferior, although a considerable river. Its chief tributary is the Chilchik, which falls into it from the north-east, a few miles above



ashkund. The Jaxartes is now called Sir or Seer, but the Arabian geographers name it Syhoon, and the Oxus, Jyhoon. In the winter it is to be crossed in some places on the ice, but in summer rafts are used. In the Oxus both rafts and boats are used. The practice with respect to both, and on both rivers, is to yoke to them the passenger's horses and cause them to transport them across by swimming. Of the Neelum we know only that it falls into the lake of Aral, and comes from an easterly point.

46. Nor is our knowledge much more detailed of the streams of Chinese Toorkistan. All of them seem to be collected in one river, ultimately lost in a lake beyond Toorfan. Even this river is not reported to be of very great magnitude: this is another reason to disbelieve the existence of a very high and snowy range in this quarter, for such has never been found to give source to great streams (see para. 7.) The Tukkus is laid down in the latest maps as running north into the Russian territory, but according to the information received by us, runs south into the Chinese. The geography of this country seems destined to remain long obscure. It is no longer the scene of important events, nor does it lie in the line of traveller's routes. The cities of Kashghur and Yarkund are indeed visited by merchants of Kushmeer, Pushwar, Budukhshan, and Toorkistan, and from them tea, silver, and some other Chinese commodities are diffused over the neighbouring countries. Few however proceed further, and inquiry is scarcely safe under the jealous and vigilant government of China.

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#### *Lakes.*

47. Most of the lakes of note have been already alluded to. The greatest is the Aral, which receives all the rivers of Toorkistan. Its waters are salt. Those of the lake of Seestan are slightly brackish. The whole of this last can be seen in one view by a spectator from the shore. It is encompassed by a tract of marshy land overgrown with reeds and aquatics, and a day's journey in breadth. In the middle is a little high island and on it a fort, this island is called Koh-i-zoor, and is in north latitude  $31^{\circ} 35'$  and east longitude  $63^{\circ} 25'$ . The well known Dul and Oollur are situated in Kushmeer. The latter is formed by the Uidusta; the former is unconnected with it, except that when raised by rains it discharges its superfluous waters into that river. No particulars are yet known of the lake of Toorfan (see para. 46) which is perhaps fabulous. Neither the

Aral nor the Seestan lake are navigated except by fishers or fowlers. The rivers too we have enumerated are more generally an obstruction to intercourse than a facility. Wood is indeed floated on them from the mountains, and in some cases goods are conveyed on raft from a higher to a lower place. We are also to except the Indus and its eastern tributaries, which are navigated by trading boats as on the rivers of our own provinces. The trade thus carried on is indeed far inferior in amount to what is anticipated, and that especially in the case of the Indus. In lower Sindh and Kushmeer alone water carriage is the chief mode of transportation in the country. But these and the particulars of ferries and fords, and modes of crossing rivers need not be here mentioned in detail, since they are in the province of Lieut. Macartney. I may have appeared to have already greatly encroached on it, but this introductory matter seemed necessary to the readily and correctly apprehending what follows.

*(To be continued.)*

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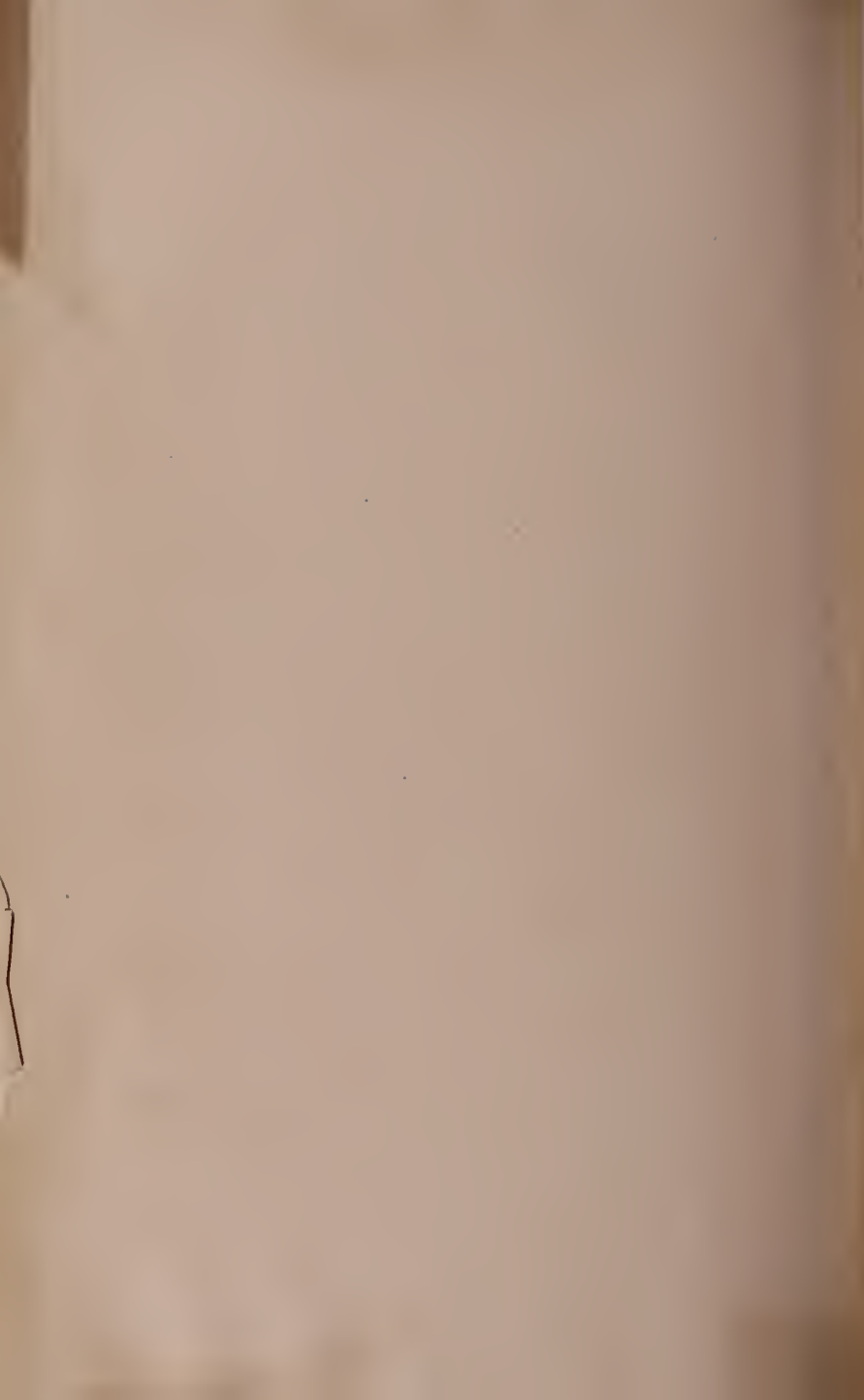
| Day of the Month | Moon's Phases | Minimum Temperature observed at Sun-rise. |                      |             |                          |          | Maximum Pressure observed at 9 h. 50 m. |              |                      |             |                          | Observations made at Apparent Noon. |                              |              |                      |             |                          |          |                                 |
|------------------|---------------|-------------------------------------------|----------------------|-------------|--------------------------|----------|-----------------------------------------|--------------|----------------------|-------------|--------------------------|-------------------------------------|------------------------------|--------------|----------------------|-------------|--------------------------|----------|---------------------------------|
|                  |               | Temperature.                              |                      |             |                          | Wind.    | Aspect of the Sky.                      | Temperature. |                      |             |                          | Wind.                               | Aspect of the Sky.           | Temperature. |                      |             |                          | Wind.    | Aspect of the Sky.              |
|                  |               | Barometer.                                | Of the Mer-<br>cury. | Of the Air. | Of an Evapg.<br>Surface. |          |                                         | Barometer.   | Of the Mer-<br>cury. | Of the Air. | Of an Evapg.<br>Surface. |                                     |                              | Barometer.   | Of the Mer-<br>cury. | Of the Air. | Of an Evapg.<br>Surface. |          |                                 |
| 1                |               | 29,671                                    | 50.0                 | 76.0        | 71.9                     | Calm.    | Clear                                   | 29,729       | 85.3                 | 88.5        | 79.2                     | S. W.                               | Clear                        | 29,710       | 86.7                 | 90.0        | 79.5                     | W.       | Clear.                          |
| 2                |               | 680                                       | 79.2                 | 74.5        | 73.6                     | Calm.    | Clear.                                  | 730          | 83.0                 | 87.0        | 81.0                     | S. W.                               | Clear.                       | 708          | 85.1                 | 90.0        | 83.0                     | W.       | Cumuli interspersed zen. Clear. |
| 3                |               | 702                                       | 79.9                 | 77.0        | 76.9                     | Calm.    | Clear.                                  | 754          | 83.6                 | 87.9        | 80.7                     | S. ...                              | Clear.                       | 742          | 84.9                 | 87.0        | 80.0                     | S. ...   | Cumuli.                         |
| 4                |               | 710                                       | 80.0                 | 77.5        | 76.7                     | Calm.    | Clear.                                  | 786          | 84.8                 | 86.8        | 81.0                     | W.                                  | Clear.                       | 760          | 85.2                 | 87.5        | 81.9                     | S. W.    | Cumuli.                         |
| 5                |               | 749                                       | 79.7                 | 78.0        | 76.1                     | Calm.    | Clear.                                  | 810          | 84.7                 | 88.0        | 80.8                     | S. W.                               | Cirro-strati.                | 790          | 85.2                 | 89.0        | 81.0                     | r. b. s. | Cloudy.                         |
| 6                |               | 753                                       | 80.0                 | 79.5        | 78.8                     | Calm.    | Clear.                                  | 800          | 83.8                 | 82.5        | 81.0                     | w. b. s.                            | Cumuli a few                 | 788          | 84.2                 | 87.6        | 81.8                     | W.       | A few Cumuli.                   |
| 7                |               | 764                                       | 82.2                 | 80.0        | 79.0                     | Calm.    | Clear.                                  | 808          | 84.9                 | 86.0        | 82.1                     | W.                                  | Cloudy.                      | 808          | 85.6                 | 89.2        | 83.9                     | W.       | Cumuli.                         |
| 8                |               | 798                                       | 83.5                 | 80.8        | 79.9                     | Calm.    | Clear.                                  | 852          | 85.1                 | 90.0        | 85.0                     | S. W.                               | Cumuli.                      | 820          | 87.5                 | 92.8        | 85.2                     | N. W.    | Cumuli.                         |
| 9                |               | 776                                       | 84.3                 | 79.9        | 79.1                     | Calm.    | To the East Cirro-strati                | 823          | 85.4                 | 87.5        | 83.2                     | W.                                  | Cloudy (Cumuli.)             | 800          | 87.4                 | 90.0        | 81.1                     | N. W.    | Cumuli                          |
| 10               |               | 769                                       | 84.5                 | 81.2        | 80.8                     | Calm.    | Clear.                                  | 808          | 85.2                 | 89.2        | 81.0                     | N. W.                               | Clear.                       | 789          | 88.0                 | 91.0        | 80.5                     | N. W.    | Clear.                          |
| 11               |               | 720                                       | 80.2                 | 77.0        | 75.1                     | N. W.    | Clear.                                  | 760          | 81.1                 | 86.0        | 78.2                     | N. W.                               | Light Haze.                  | 747          | 84.9                 | 87.8        | 78.9                     | N. W.    | Light Haze.                     |
| 12               |               | 708                                       | 78.5                 | 75.1        | 73.0                     | N.       | Clear.                                  | 750          | 83.2                 | 87.0        | 79.0                     | W.                                  | Generally Clear              | 728          | 85.8                 | 89.3        | 80.8                     | N.       | Cirro-strati.                   |
| 13               |               | 700                                       | 81.2                 | 79.0        | 78.0                     | N. E.    | Cloudy.                                 | 730          | 83.9                 | 87.5        | 82.0                     | N. W.                               | Cumuli a few.                | 708          | 84.3                 | 88.0        | 83.0                     | w. b. n. | Cumuli.                         |
| 14               |               | 698                                       | 80.0                 | 75.1        | 73.5                     | N.       | Clear.                                  | 732          | 82.4                 | 85.1        | 78.5                     | W.                                  | Light Cirro-strati.          | 720          | 84.0                 | 89.0        | 77.6                     | w. b. s. | Generally Clear                 |
| 15               |               | 717                                       | 78.9                 | 74.9        | 73.0                     | N.       | Clear.                                  | 772          | 82.0                 | 84.9        | 75.0                     | W.                                  | Clear                        | 754          | 83.5                 | 89.1        | 79.0                     | W.       | Clear.                          |
| 16               |               | 761                                       | 75.0                 | 71.0        | 70.2                     | N.       | Clear.                                  | 804          | 81.5                 | 83.9        | 75.0                     | N. W.                               | Clear                        | 788          | 82.0                 | 86.8        | 77.3                     | N. W.    | Clear.                          |
| 17               |               | 800                                       | 76.0                 | 71.5        | 70.5                     | N.       | Clear.                                  | 860          | 79.9                 | 80.4        | 73.8                     | r. b. n.                            | Clear.                       | 857          | 81.5                 | 84.5        | 76.0                     | w. b. n. | Clear.                          |
| 18               |               | 850                                       | 76.5                 | 71.8        | 70.8                     | N.       | Clear.                                  | 916          | 80.6                 | 81.9        | 74.0                     | N. W.                               | Clear                        | 910          | 83.5                 | 88.7        | 77.0                     | N.       | Clear.                          |
| 19               |               | 856                                       | 77.0                 | 73.5        | 72.0                     | Calm.    | Clear.                                  | 926          | 80.8                 | 85.5        | 77.0                     | N. W.                               | Clear                        |              |                      |             |                          |          |                                 |
| 20               |               | 864                                       | 77.5                 | 71.0        | 70.5                     | N.       | Clear.                                  | 920          | 81.0                 | 83.8        | 74.2                     | w. b. n.                            | Clear.                       | 912          | 84.3                 | 87.6        | 78.0                     | N.       | Clear.                          |
| 21               |               | 810                                       | 74.0                 | 62.5        | 61.2                     | N.       | Clear.                                  | 862          | 79.5                 | 84.5        | 75.0                     | W.                                  | Clear.                       | 850          | 80.8                 | 85.6        | 75.7                     | N. W.    | Clear.                          |
| 22               |               | 800                                       | 73.5                 | 63.0        | 62.5                     | N.       | Clear.                                  | 852          | 78.9                 | 83.5        | 74.9                     | r. b. n.                            | Clear.                       | 838          | 81.5                 | 85.9        | 74.5                     | W.       | Clear.                          |
| 23               |               | 838                                       | 74.2                 | 64.5        | 63.4                     | N.       | Clear.                                  | 896          | 78.0                 | 81.5        | 73.2                     | N. W.                               | Clear.                       | 880          | 81.3                 | 85.0        | 73.0                     | N. W.    | Clear.                          |
| 24               |               | 880                                       | 75.1                 | 66.0        | 64.9                     | N.       | Clear.                                  | 936          | 78.3                 | 83.5        | 76.0                     | N.                                  | Clear.                       | 924          | 82.6                 | 86.9        | 77.0                     | n. b. e. | Clear.                          |
| 25               |               | 902                                       | 78.2                 | 73.5        | 72.1                     | N.       | Cloudy                                  | 30,064       | 79.6                 | 84.9        | 76.8                     | N. E.                               | Clear.—To the N W Cirro-str. | 30,050       | 83.7                 | 89.0        | 79.1                     | N. E.    | Clear.                          |
| 26               |               | 30,000                                    | 78.5                 | 75.2        | 73.1                     | N.       | Cirro-strati                            | 30,036       | 81.2                 | 85.5        | 76.9                     | N. E.                               | Clear.                       | 29,994       | 84.6                 | 88.1        | 79.0                     | N.       | Cirro-Cumuli                    |
| 27               |               | 29,936                                    | 76.4                 | 72.5        | 71.0                     | N. E.    | Clear.                                  | 29,976       | 80.0                 | 84.8        | 75.8                     | N. E.                               | Clear.                       | 954          | 81.8                 | 87.5        | 78.8                     | r. b. n. | Clear.                          |
| 28               |               | 942                                       | 75.5                 | 70.0        | 69.0                     | e. b. n. | Clear.                                  | 980          | 80.3                 | 84.5        | 75.5                     | e. b. s.                            | Clear.                       | 950          | 82.4                 | 87.0        | 77.0                     | S. E.    | Clear.                          |
| 29               |               | 976                                       | 78.0                 | 73.0        | 71.0                     | Calm.    | Clear.                                  | 30,010       | 80.5                 | 84.8        | 75.5                     | E.                                  | Clear.                       | 30,004       | 84.2                 | 87.1        | 75.5                     | N.       | Clear.                          |
| 30               |               | 981                                       | 77.5                 | 69.5        | 69.5                     | Calm.    | Clear.                                  | 930          | 80.1                 | 84.5        | 74.1                     | N. W.                               | Clear.                       | 910          | 82.8                 | 86.9        | 75.0                     | N.       | Clear.                          |
| 31               |               | 980                                       | 76.5                 | 69.0        | 69.0                     | Calm.    | Clear.                                  | 918          | 79.7                 | 84.9        | 77.0                     | N. E.                               | Clear.                       | 29,996       | 83.8                 | 88.9        | 77.0                     | e. b. n. | Clear.                          |
| Mean.            |               | 29,814                                    | 78.5                 | 73.5        | 72.6                     |          |                                         | 862          | 82.0                 | 85.1        | 77.8                     |                                     |                              | 843          | 81.1                 | 88.1        | 82.0                     |          |                                 |

| Day of the Month. | Maximum Temperature observed at 2 p. 40 m. |                      |             |                         |       | Minimum Pressure observed at 4 p. m. |                          |                                           |                      |             | Observations made at Sun-set. |                    |                         |                         |                      | Rain Gauge. |       |                    |                        |        |                         |
|-------------------|--------------------------------------------|----------------------|-------------|-------------------------|-------|--------------------------------------|--------------------------|-------------------------------------------|----------------------|-------------|-------------------------------|--------------------|-------------------------|-------------------------|----------------------|-------------|-------|--------------------|------------------------|--------|-------------------------|
|                   | Barometer.                                 | Temperature.         |             |                         | Wind. | Aspect of the Sky.                   | Barometer.               | Temperature.                              |                      |             | Wind.                         | Aspect of the Sky. | Barometer.              | Temperature.            |                      |             | Wind. | Aspect of the Sky. | Upper.                 | Lower. |                         |
|                   |                                            | Of the Mer-<br>cury. | Of the Air. | Of an Evap-<br>Surface. |       |                                      |                          | Therm. exposed to<br>the rays of the sun. | Of the Mer-<br>cury. | Of the Air. |                               |                    |                         | Of an Evap-<br>Surface. | Of the Mer-<br>cury. | Of the Air. |       |                    |                        |        | Of an Evap-<br>Surface. |
| 1                 | 29,690                                     | 88.0                 | 92.2        | 80.8                    | 115.2 | S. W.                                | Clear.                   | 29,650                                    | 87.8                 | 90.0        | 81.8                          | S. W.              | Clear.                  | 29,655                  | 85.2                 | 86.0        | 80.0  | S. W.              | Clear.                 |        |                         |
| 2                 | 672                                        | 85.2                 | 91.1        | 81.5                    | 111.0 | W.                                   | A few detached Clds zen. | 654                                       | 85.0                 | 90.5        | 81.2                          | W.                 | Clear.                  | 659                     | 84.4                 | 85.8        | 80.2  | Calm.              | Clear.                 |        |                         |
| 3                 | 680                                        | 84.5                 | 90.8        | 81.2                    | 110.6 | S. W.                                | Cumuli.                  | 680                                       | 84.9                 | 89.2        | 80.8                          | W.                 | Cumuli.                 | 687                     | 84.1                 | 84.6        | 80.0  | Calm.              | Clear.                 |        |                         |
| 4                 | 710                                        | 85.8                 | 89.7        | 82.5                    | 111.5 | S. W.                                | Cumuli.                  | 699                                       | 85.7                 | 88.5        | 83.0                          | S. W.              | Cumuli zen.             | 749                     | 83.9                 | 84.2        | 79.9  | Calm.              | Clear.                 |        |                         |
| 5                 | 662                                        | 86.7                 | 91.4        | 81.9                    | 112.0 | W.                                   | To the North Nimb.       | 750                                       | 85.5                 | 87.8        | 81.5                          | N. W.              | Cloudy.                 | 758                     | 84.2                 | 85.0        | 80.0  | N. W.              | Nimb.                  |        |                         |
| 6                 | 729                                        | 86.0                 | 90.9        | 82.7                    | 113.0 | W.                                   | Cumuli.                  | 718                                       | 85.0                 | 90.0        | 82.5                          | w. b. n.           | Cumuli.                 | 724                     | 84.4                 | 84.9        | 80.0  | Calm.              | Cirro-strati.          |        |                         |
| 7                 | 762                                        | 86.6                 | 91.2        | 81.0                    | 111.7 | S. W.                                | Cum. strati.             | 750                                       | 86.7                 | 91.9        | 85.0                          | S. W.              | Cum strati.             | 766                     | 86.5                 | 87.5        | 82.0  | Calm.              | To the E. Cum.-strati. |        |                         |
| 8                 | 752                                        | 87.6                 | 91.9        | 80.4                    | 111.0 | W.                                   | Cumuli                   | 753                                       | 87.6                 | 92.7        | 85.0                          | N. W.              | Cumuli zen.             | 760                     | 86.9                 | 87.0        | 83.9  | Calm.              | Cum str. on the floor. | 0.53   | 0.59                    |
| 9                 | 740                                        | 87.0                 | 95.9        | 86.8                    | 111.2 | N. W.                                | Cumuli.                  | 720                                       | 86.5                 | 90.8        | 84.2                          | N. W.              | Cumuli.                 | 722                     | 86.0                 | 87.2        | 83.8  | N. W.              | Clear.                 |        |                         |
| 10                | 730                                        | 87.3                 | 93.0        | 81.0                    | 103.0 | N. W.                                | Clear.                   | 708                                       | 86.4                 | 94.0        | 80.0                          | n. w. v.           | Clear.                  | 708                     | 85.6                 | 86.0        | 80.0  | Calm.              | Clear.                 |        |                         |
| 11                | 680                                        | 85.5                 | 89.8        | 79.0                    | 106.0 | N. W.                                | Light Haze partially     | 666                                       | 85.5                 | 88.8        | 79.0                          | N. W.              | Light Haze partially    | 666                     | 83.9                 | 84.5        | 78.8  | Calm.              | Clear.                 |        |                         |
| 12                | 673                                        | 85.7                 | 80.9        | 84.5                    | 106.9 | w. b. n.                             | Cirro-strati.            | 658                                       | 85.4                 | 89.3        | 82.5                          | w. b. n.           | Cirro-strati.           | 662                     | 84.5                 | 86.6        | 82.0  | Calm.              | Clear.                 |        |                         |
| 13                | 650                                        | 84.0                 | 87.5        | 82.8                    | 104.0 | N. W.                                | Cumulo strati            | 638                                       | 84.0                 | 87.2        | 82.0                          | N. W.              | Cumulo-strati and Nimb. | 644                     | 83.6                 | 86.0        | 79.8  | Calm.              | Cirro-strati.          |        |                         |
| 14                | 678                                        | 85.0                 | 91.0        | 79.0                    | 109.0 | W.                                   | Clear.                   | 670                                       | 84.4                 | 88.9        | 78.7                          | w. b. n.           | Clear.                  | 677                     | 83.8                 | 81.0        | 77.1  | Calm.              | Generally Clear        |        |                         |
| 15                | 716                                        | 84.6                 | 91.2        | 79.5                    | 106.0 | W.                                   | Clear.                   | 716                                       | 84.9                 | 89.2        | 79.0                          | W.                 | Clear.                  | 720                     | 83.5                 | 84.5        | 78.0  | Calm.              | Clear.                 |        |                         |
| 16                | 740                                        | 83.5                 | 91.2        | 78.8                    | 108.2 | W.                                   | Clear.                   | 740                                       | 83.3                 | 88.5        | 78.5                          | N. W.              | Clear.                  | 716                     | 83.0                 | 85.2        | 77.7  | N. W.              | Clear.                 |        |                         |
| 17                | 830                                        | 83.0                 | 87.5        | 78.0                    | 107.0 | N.                                   | Clear.                   | 810                                       | 83.0                 | 86.8        | 77.7                          | N.                 | Clear.                  | 814                     | 82.7                 | 84.5        | 76.0  | N.                 | Clear.                 |        |                         |
| 18                | 854                                        | 81.3                 | 89.3        | 79.5                    | 110.0 | N.                                   | Clear.                   | 838                                       | 84.0                 | 87.5        | 79.0                          | N.                 | Clear.                  | 844                     | 82.9                 | 85.0        | 76.7  | Calm.              | Clear.                 |        |                         |
| 19                | 860                                        | 85.0                 | 91.2        | 81.0                    | 111.3 | W.                                   | Clear.                   | 847                                       | 84.4                 | 88.8        | 79.5                          | N.                 | Clear.                  | 849                     | 73.0                 | 81.5        | 75.5  | N. W.              | Clear.                 |        |                         |
| 20                | 864                                        | 85.5                 | 90.0        | 79.5                    | 108.0 | N.                                   | Clear.                   | 820                                       | 82.2                 | 87.5        | 78.7                          | N.                 | Clear.                  | 820                     | 81.5                 | 83.0        | 74.8  | N. W.              | Clear.                 |        |                         |
| 21                | 799                                        | 82.7                 | 89.0        | 77.0                    | 101.0 | N. W.                                | Clear.                   | 790                                       | 82.7                 | 86.9        | 74.9                          | N. W.              | Clear.                  | 798                     | 81.8                 | 82.9        | 73.5  | N. W.              | Clear.                 |        |                         |
| 22                | 812                                        | 81.5                 | 86.7        | 78.5                    | 109.2 | W.                                   | Clear.                   | 796                                       | 80.7                 | 85.2        | 81.8                          | N.                 | Clear.                  | 799                     | 80.2                 | 82.0        | 75.0  | Calm.              | Clear.                 |        |                         |
| 23                | 858                                        | 81.3                 | 87.0        | 74.8                    | 99.9  | N.                                   | Clear.                   | 858                                       | 80.9                 | 81.1        | 73.0                          | N.                 | Clear.                  | 858                     | 80.5                 | 82.1        | 72.5  | N.                 | Clear.                 |        |                         |
| 24                | 898                                        | 82.4                 | 90.0        | 79.0                    | 101.0 | N.                                   | Clear.                   | 877                                       | 82.0                 | 83.0        | 78.7                          | N.                 | Clear.                  | 880                     | 81.5                 | 84.2        | 74.4  | Calm.              | Clear.                 |        |                         |
| 25                | 986                                        | 83.4                 | 90.0        | 81.2                    | 101.0 | N. W.                                | To the E. Cirro-strati   | 980                                       | 83.0                 | 87.5        | 79.0                          | N. E.              | Cirro-strati            | 990                     | 82.9                 | 84.9        | 78.0  | n. b. w.           | Cirro-strati           |        |                         |
| 26                | 933                                        | 83.6                 | 90.0        | 89.4                    | 102.0 | N.                                   | Cirro-strati             | 920                                       | 82.9                 | 86.8        | 79.5                          | N.                 | Cirro-strati.           | 923                     | 82.5                 | 83.9        | 77.5  | W.                 | Cloudy                 |        |                         |
| 27                | 915                                        | 82.7                 | 83.5        | 82.8                    | 100.0 | W.                                   | Clear.                   | 904                                       | 82.5                 | 85.9        | 81.9                          | N.                 | Clear.                  | 909                     | 82.3                 | 84.0        | 78.5  | Calm.              | Clear.                 |        |                         |
| 28                | 913                                        | 82.9                 | 90.0        | 78.8                    | 105.0 | W.                                   | Clear.                   | 913                                       | 81.8                 | 87.5        | 78.9                          | W.                 | Clear.                  | 917                     | 81.5                 | 83.9        | 77.0  | Calm.              | Clear.                 |        |                         |
| 29                | 982                                        | 83.0                 | 88.0        | 75.7                    | 104.2 | N.                                   | Clear.                   | 980                                       | 83.0                 | 87.0        | 75.5                          | N.                 | Clear.                  | 936                     | 82.5                 | 84.0        | 74.5  | Calm.              | Clear.                 |        |                         |
| 30                | 971                                        | 83.0                 | 88.9        | 77.5                    | 99.0  | N. W.                                | Clear.                   | 968                                       | 82.7                 | 87.0        | 77.0                          | N. W.              | Clear.                  | 970                     | 82.0                 | 83.9        | 74.8  | Calm.              | Clear.                 |        |                         |
| 31                | 937                                        | 82.9                 | 89.8        | 77.2                    | 102.3 | N.                                   | Clear.                   | 936                                       | 82.8                 | 87.0        | 77.0                          | N. W.              | Clear.                  | 940                     | 82.1                 | 84.2        | 74.5  | Calm.              | Clear.                 |        |                         |
| Mean              | 799                                        | 84.5                 | 90.3        | 80.6                    | 106.5 |                                      |                          | 785                                       | 84.1                 | 88.3        | 80.0                          |                    |                         | 792                     | 83.3                 | 81.7        | 78.0  |                    |                        | 0.53   | 0.59                    |









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